

**An Assessment
of the Patentability of Business Methods
in the US and European Jurisdictions
and an Evaluation of the Implications**

Li Sun

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Declaration

I declare that the work presented in this thesis was carried out by myself at Napier University, unless otherwise acknowledged

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Abstract

Advances in information technology have enabled the design and development of innovations in business methods. This is particularly felt with IT enabled innovations such as Sun Microsystems' stateless shopping Cart for the web which is a Web shopping cart system that does not require any data files to be maintained on either the client or the server. Firms attempt to leverage these innovations to gain competitive advantages through cost reduction and other quality improvements, which may also pass some benefits on to consumers. However, such competitive advantages are increasingly difficult to sustain because business method innovations are often easy to copy or imitate. Quick and cheap imitation of innovative products and processes may reduce the incentives for firms to invest further in innovation. Thus, patent protection for business method inventions became a live issue with different outcomes as between the US and Europe. At present, in the US business method patents are legally recognised since the *State Street Bank* decision, 149 F. 3d 1368 (US Court of Appeals for the Federal Circuit 1998). However, the European Patent Office (EPO) still is noncommittal although some business method-related inventions have been granted *de facto* protection by EPO such as Hitachi Ltd's automatic trading method and apparatus (EP 567 291), the Western Union Company's method and system for performing money transfer transactions (EP 848 361) etc.. John Stuart Mill (1909) said "the superiority of one country over another, in a branch of production, often arises only from having begun it sooner".¹ So it seems that the uncertainty of EPO's attitude to business method patents may result in a serious negative impact in European industry and economy.

This thesis sets out to examine what precisely are the attitudes of the US and European institutions to business method patents and to explain what is the present law and how it has

¹ Mill, J. S., 1909. *Principles of Political Economy*. 7th ed. London: Longmans Green. p. 78

arisen. The author thereafter carries out an evaluation of the rationed economic and social effects of allowing / disallowing Business Method Patents and to address the question of whether Europe should adopt patent protections for business method – related inventions.

To address these questions, the research focuses on the following questions: (1) under the current legal framework provided by EPC what business method – related inventions can be granted European patent? (2) whether business method – related inventions are worth protecting by the patents in Europe. To answer the latter question, the thesis not only analyses the predictable economic and social effects of allowing or alternatively disallowing business method protections generally, but we also discuss “patent quality” which is used by US patent economists to analyse whether business method inventions have a sufficient value to justify the granting of exclusive patent rights in return for disclosure of the inventions’ specifications to the public. In analysing the predictable and likely economic and social effects of allowing or alternatively disallowing business method protections, the US position in patenting business method – related inventions needs to be considered, therefore the thesis also evaluates the US patent legal framework for business method patents and contrasts it with the European position. Through analysis of the relevant provisions and decisions, the research has concluded that under the current legal framework business method apparatus inventions are patentable in Europe if they can meet the patentability requirements of the European Patent Convention (EPC). To the effect that if a business method process invention is achieved by a technical means, solves a technical problem, or achieves a technical effect, it is often patentable in Europe provided it meets the EPC patentability requirements. However, turning to the evaluation of the economic effects of business method patents, economic analysis cannot find strong evidence to support increasing the current protections for business method patents. At the same time, the economic analysis also cannot find strong evidence to

oppose present protections for business method patents. But when the US position is considered, infringement risk would favour it for it appears on balance that there may be some reason to think that Europe should adopt stronger protections for business method patents. Furthermore, the value of disclosing patented business method – related inventions’ specifications seems also to show that accepting business method patents is an appropriate choice for Europe.

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Abbreviations

BMI: Business method invention

BMIs: Business method inventions

BMP: Business method patent

BMPs: Business method Patents

BPAI: (United States) Board of Patent Appeals and Interferences

CAFC: United States Court of Appeals of the Federal Circuit

EBoA: EPO's Enlarged Board of Appeal

EPC: European Patent Convention

EPO: European Patent Office

EPOrg: European Patent Organisation

EPO Guidelines: The Guidelines for the Examination in the EPO

IPR: Intellectual property right

IPRs: Intellectual property rights

IT: Information Technology

MPEP: (United States) Manual of Patent Examining Procedure

R&D: Research and development

SMEs: Small and medium enterprises

State Street Bank decision: The decision of the United States Court of Appeals for the Federal Circuit in *State Street Bank and Trust Company v. Signature Financial Group, Inc.*, 149 F. 3d 1368 (Fed. Cir. 1998)

STIC: The Scientific and Technical Information Center.

Technical Boards: The Technical Boards of Appeal of the EPO

UKIPO: The Intellectual Property Office of the United Kingdom

UKPO: United Kingdom Patent Office. (From 2 April 2007, the operating name is changed to the Intellectual Property Office of the United Kingdom)

USPC: United States Patent Classification System

USPTO: United States Patent and Trademark Office

U.S.C.: Patents of United States Code

Chapter One: Introduction

Doing business is always achieved by the use of efficacious methods. In early human societies people did business by barter with the assistance of linguistic formulae. However, barter was a very inconvenient means of trading because it required a double coincidence of wants on the one hand and of values on the other. With the growth of populations, the increase of the demand and the production of goods, people needed some medium (e.g. the invention of money) to solve the problem of values and in addition, businessmen or business organizations (such as guilds) could help to meet demands by means of diverse business methods. There was a definite relationship between the growth and development of enterprises and the development of enterprises' business methods. The important role played by business methods resulted in businessmen and other stakeholders seeking legal protections for their business methods. Trade secret law was the primary approach in law to achieve protection of competitive methods.

Trade Secret protections provide insufficient protection for business method inventions because inventions are easily analysed or imitated using reverse engineering. However, it was realised that temporary monopoly rights provided by patent law could perhaps afford some useful protection. So it came about that there was an attempt in 1868 for the first time to patent a business method². The Hotel Security Checking Co. application was unsuccessful but was referred to a number of similar applications whereby the US courts come to accept some business methods could be protected by patent. However, successful business method patents were rare to non-existent between 1868 to the end of 20th century. Patent examiners and many other stakeholders generally regarded business method inventions as unpatentable subject

² John Tyler's "Cash-registering and Account-checking" invention (see *Hotel Security Checking Co. v. Lorraine Co.*, 160 F. 467 (2d Cir. 1908)). See Section 4.2.1, Chapter 4 of this thesis for a more detailed description.

matter³.

Nevertheless, this initial reluctance has gradually been questioned with the global acceptance of computer enabled technologies and the Internet which together have revolutionised ways of doing business⁴. Computer use in business has resulted in people rethinking the patentability of business method inventions.

The US landmark case, State Street Bank & Trust Co. v. Signature Financial Group⁵, wherein Signature Financial Group was granted a US business method patent entitled "Data Processing System for Hub and Spoke Financial Services Configuration"⁶ on 9 March 1999, aroused the public attention. It established that such computer enabled automatic data handling systems could be granted business method patents and forced IT businesses to review the whole issue of patent protection for their innovations once thought non-protectable. In the State Street Bank case, the court said that "the transformation of data, representing discrete dollar amounts, by a machine though a series of mathematical calculations into a final share price, constitutes a practical application... produces a useful, concrete and tangible result" and hence held the claimed invention is patentable. The decision opened the flood gates for patent protection for certain types of business methods and

³ In the 1868 USPTO hearing Ex parte Abraham, the patent Commissioner asserted that "it is contrary to the spirit of the law ... to grant patents for methods of book-keeping" (1868 Com'r Dec 59). Also United in the USPTO Manual of Patent Examining Procedures ("MPEP") (1983), the Section 706.03 (a) provided: though seemingly within the category of process or method, a method of doing business can be rejected as not being within the statutory classes. This MPEP provision provided grounds summarily to reject a business method patent application. In 1996 the paragraph was deleted from the MPEP to reflect a shift in attitude towards software patents and their associated processes. See also Grusd, J. E., 1999. Internet Business Methods: What Role Does and Should Patent Law Play?. *Virginia Journal of Law and Technology*, 4(9), pp. 1522-1687. In this study, the author stated "patents should not be granted to Internet business methods". In Europe, EPC 52 (1973) provides "the following in particular shall not be regarded as inventions within the meaning of paragraph 1 [i.e. Patentable invention] ... (c) schemes, rules and methods for ... doing business..."

⁴ For example, through its Website (www.amazon.com), the easy-to-use and easy-to-learn consumer interfaces created by Amazon.com, Inc. enables worldwide customers to find and purchase books, music, videos, and other items over the World Wide Web.

⁵ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998)

⁶ This is a computerized business method that pooled mutual fund assets into an investment portfolio that was organized as partnership for tax benefits. See Section 4.2.9, chapter four of this thesis for a more detailed description.

resulted in many companies rushing to patent their business method inventions in the US⁷.

However, in Europe⁸, although a few business method inventions had been able to obtain patent protection de facto⁹, the status of patenting business method inventions remains ambiguous.

According to article 52 (2) and (3) of the European Patent Convention (EPC)¹⁰, it seems that where a business method invention is a way of doing business "as such" the invention must be regarded as a nonpatent-eligible subject matter. But this language is somewhat obscure. How are we to understand a way of doing business method "as such"? Is a computer technology enabled process not a business method "as such"? If a business method invention is not regarded as being so "as such", then it seems it becomes patent-eligible and would be patentable when the invention meet the requirements for patentability (i.e., novelty, inventive step and industrial application)¹¹. So where is the line between that which is patentable and

⁷ "The history of business method patent application filings at the U.S. Patent and Trademark Office (USPTO) has been somewhat turbulent. Filing rates at the USPTO increased by more than three-fold between 1999 and 2001, averaging about 9,000 filings a year. ... A steady increase in filings occurred between 2005 and 2006 and then climbed rapidly again in 2006." see Muzilla, D. J., 2007. The Current State of Business method Patents in the United States. [online] Available at: <<http://www.hahnlaw.com/references/673.pdf>> [Accessed 22 July 2009]. Also according to the author's search in USPTO Patent Full-Text and Image Database with the keyword "CCL/705/\$" and "ISD/\$/(year)" on February 4, 2013, the number of the business method patents belonged to US Patent Class 705 granted by USPTO in each year between 1999 to 2012 are: 970 (Year: 1999), 1020 (Year: 2000), 818 (Year: 2001), 835 (Year: 2002), 868 (Year: 2003), 900 (Year: 2004), 1356 (Year: 2005), 2119 (Year: 2006), 1937 (Year: 2007), 2525 (Year: 2008), 2936 (Year: 2009), 5260 (Year: 2010), 5471 (2011), 6635 (2012).

⁸ In this thesis, except where the specific context, the scope of "Europe" is limited to the countries where EPC has been entered into force.

⁹ For example, European patent number EP 086 199, "System for determining the queue for serving customers at a plurality of service points", granted 04 Aug 1987. Also European patent number EP 209 907, "General-purpose management system, method for operating said system and transfer slip", granted 15 May 1996. European patent number EP 0 927 945 "Method and system for placing a purchase order via a communications network", granted 23 April 2003. See Section 3.2, chapter three for a more detailed description.

¹⁰ The full text of Article 52 EPC also is given in Appendix 2.

¹¹ Generally, "patent-eligible" subject matter and "patentable" subject matter are used alternatively with the same implication. However, this research is not only to answer what kind of business method - related inventions can be involved in or excluded from statutory patent-eligible subject matter but also to solve what requirements need to be met for those business method - related inventions which are involved in statutory patent-eligible subject matter in order to be granted patent protection. To distinguish these two terminologies, in this thesis, except where the specific context (e.g. case law, literature), "patent-eligible" and "patentable" will be used with different meanings. "Patent-eligible" subject matter will be understood as the statutory categories which are not excluded subject-matter under patent law and are capable of getting a patent. If an individual subject matter involved in "patent-eligible" categories meets the requirements for patentability (e.g. industrial application, novelty and inventive step ruled by EPC), such subject matter will be regarded as "patentable" subject matter.

that which is non-patentable business method inventions? How do we distinguish them? The European Patent Office still does not provide an explicit definition or explanation.

In some decisions¹² of the boards of appeal the European Patent Office has used a “technical character/contribution” criterion to grant or reject patents to the inventions which involve use of business method.

But as with the concept of “as such”, the term of “technical character/contribution” adopted by the EPO still confuses applicants, examiners and other stakeholders.

Besides justifying the patentability of business method - related inventions in law, public attitudes in patenting business method – related inventions have also been considered by policy deciders. On 19 October 2000, the European Commission also launched a consultation on the subject, *"The Patentability of Computer-implemented inventions"*, wherein some of the questions related to business method patents. At the end of the consultation, the European Commission expressed a skeletal negative attitude to the patenting of business methods and pointed out that if matters were to change extreme care would be taken in patenting business methods and thus there should be certain limits (e.g. technical considerations) on the patenting of business method.¹³

At the same time, the United Kingdom also conducted a consultation, called *"Should Patents be Granted for Computer Software or Ways of Doing Business"*, which gave more positive conclusion but stated that ways of doing business should remain unpatentable unless and until

¹² For example: Decision T1002/92 *Queueing system* (1994), Decision T 0769/92 *Sohei* (1995), T0931/95 *Controlling Pension Benefits System* (2000), etc.. These decisions are analysed in detail in Chapter Three of this thesis.

¹³ PbT Consultants, 2000. The Results of the European Commission Consultation Exercise on the Patentability of Computer Implemented Inventions. [Online] Available at < http://ec.europa.eu/internal_market/indprop/docs/comp/softanalyse_en.pdf > [Accessed 15 Oct 2008].

economic evidence to support the utility of patenting business method inventions were available.¹⁴

And so it remains the case that ambiguity in European business method patentability disorients patent examiners, inventors, patent attorneys and the other stakeholders.

1.1 The purpose of the research

The purpose of this thesis is to clarify some of the concepts involved in patenting business method - related inventions in Europe and attempts to conclude under the current EPC legal framework what kind of business method - related inventions can in fact be granted patent protection or alternatives which business method patent applications should be rejected. In other words, an initial question of the thesis is to answer what are business methods "as such" within the meaning of Article 52 EPC? What business method – related inventions should be excluded from the patent-eligible subject matter provided by EPC? And correspondingly which should therefore be regarded as not being business method “as such” and so should be capable of protection.

Another question following closely on the previous is whether the current position in patenting business method - related inventions under EPC is advisable? This question will be answered from two aspects. The first aspect is whether the current position is in agreement with the purpose of patents and consists with the logic of patent law. Since the patent system is a mechanism for encouraging innovation, we will ask whether patenting business method inventions will achieve the aim of encouraging innovation in business methods. Also, through

¹⁴ UK Patent Office, 2000. Should Patents Be Granted for Computer Software or Ways of Doing Business? The Government's Conclusions.

analysis of the possible benefits and costs in the economic field whether it is worth enabling patent business methods to be patented. The second aspect is whether the current European position in patenting business method inventions is appropriate when compared and contrasted with the current US position which has explicitly accepted some business method patent protection. That is to say, what precisely are the differences between US and European patent law as regards the patenting of business method inventions and what are the impacts there in terms of social and economic effects.

1.2 Structure of the thesis

To achieve the purpose of the study, the thesis is organised as follows.

The remainder of Chapter One sets out to define important terminologies and to indicate the aims of patents as well as the classical justifications of patent protection in philosophy and economics. This chapter also analyses the existing empirical research in justifying patent mechanism, and more importantly reviews the existing literature in arguing the applicability of business method patents. The purpose of this chapter is to provide a basic foundation which the later chapters can build upon and to offer a clue on how to choose the appropriate approach to assess whether business method - related inventions are worth being patented. Thus, with the assistance of the argument surrounding business method patents, at the end of this chapter the research questions are clarified.

Chapter Two examines the methodologies used in the research in accordance with the research questions established in Chapter One and discusses the merits and demerits of available methods and their limits.

Chapter Three summarises the judicial history of business method patents in the EPO, and provides an in-depth analysis of the precedents in order to conclude under the current EPC legal framework whether business method – related inventions can be granted patent protection and if the answer is “yes” what kind of business method – related inventions can in fact be granted patent protection.

Since the study needs to consider similar issues in the US position, Chapter Four indicates the US current legal position for patenting business method through analysing the US applicative practice, and discusses the differences between the patent systems of the US and Europe with respect to the patenting of business method – related inventions.

The aim of chapters Five and Six is to assess whether the current position in patenting business method – related inventions under EPC is advisable, especially when the US position in business method patents is considered. Chapter Five discusses the quality of patented business method – related inventions by referring to the USPTO’s experiences because low quality inventions are not valuable for patent protection. Chapter Six presents the limited data available on the social and economic effects of business method patents to evaluate overall whether the current European patent legal framework is rationally necessary and socially and economically adequate in protecting business method – related inventions.

Chapter Seven contains the conclusion of the research and suggestion for the further research.

1.3 What is a business method and what is a business method invention?

To assess whether business methods should be granted patent and/or what business methods can be granted patent, it is first necessary to understand what business methods are. However, until now, there is still no clear definition of a business method or what makes it different from other types of "methods". "Without clear definitions, the legislation specifically targeted at methods may have little effect on patentability"¹⁵. The uncertainty and divergent views on what the concept of business methods amount to will result in confusion as to what justifies the patentability of business method. This thesis shall therefore firstly attempt to examine the literature in practice and academic discussions to describe what "business method" is the central argument of the dissertation and what is meant in terms by business methods.

1.3.1 The definition of business methods in American practice

In legal practice the United States Patent and Trademark Office (USPTO) has accepted business method as a patentable subject matter subject to Title 35 of the United States Code, a statute which governs all aspects of patent law in the United States. Hence, to define the business method we should refer to what is statutorily defined as business method in the US legal practice. There still remains some confusion in what constitutes a "business method" claim because "business method" is "a generic term that has been used by many [disparate persons] to describe various types of process claims"¹⁶. Neither the courts nor statute state precisely what "business method" claims amount to and thus they fail to separate it from other process claims¹⁷.

¹⁵ Kuester, J. R., & Thompson, L. E., 2001. Risks Associated With Restricting Business Method and E-Commerce Patents. *Georgia State University Law Review*, 17(3), pp. 657-690, at page 678.

¹⁶ Love, J. J., & Coggins, W. W., 2001. Successfully Preparing and Prosecuting a Business Method Patent Application. [online] Available at <www.uspto.gov/web/menu/pbmethod/aiplapaper.rtf> [Accessed 8 September 2009], at page 2.

¹⁷ In the decision *State Street Bank and Trust Co. V. Signature Financial Group, Inc.*, (149 F.3d 1368), the court stated that the claims drawn to a method of doing business should not be categorized as "business method" claim, instead they should be treated like any other process claim.

In the United States Patent and Trademark Office (USPTO) practice, based on the U.S. Patent Classification System (USPC)¹⁸, the examiners divide the applications for patents into technology classes in order to facilitate examination. The most applications closely associated with business methods are filed in USPTO's patent Classification 705 and its sub-categories.¹⁹ The Class 705 is defined as "the generic class for apparatus and corresponding methods (1) for performing **data processing**, in which there is a significant change in the data or (2) for performing **calculation operations** wherein the apparatus or method is uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data, or (3) for performing **data processing** or **calculating operations** in which a charge for goods or services"²⁰. The definition is supplemented by USPTO with guidelines²¹ defining the "Scope of the class". According to these guidelines, class 705 is "generally used for problems relating to administration of an organization, commodities or financial transactions"²². This description defines certain types of business method application. Based on the above descriptions in Class 705 of USPC, we can find the USPTO attempted to define "business method" as an apparatus and corresponding methods with one or more particular business functions. The business functions in the scope of Class 705 for which business method patent may be considered are

¹⁸ The USPC is a system created by USPTO for organizing all U.S. Patent documents and many other technical documents into relatively small collections based on common subject matter. Each subject matter division in the USPC includes a major component called a class and a minor component called a subclass. A class generally delineates one technology from another. Subclasses delineate processes, structural features and functional features of the subject matter encompassed within the scope of a class. Every class has a unique alphanumeric identifier, as do most subclasses. See United States Patent and Trademark Office, 2010. Overview of the U.S. Patent Classification System (USPC). [online] Available at <<http://www.uspto.gov/patents/resources/classification/overview.pdf>> [accessed 2 May 2011]

¹⁹ Love, J. J., & Coggins, W. W., 2001. Successfully Preparing and Prosecuting a Business Method Patent Application. [online] Available at <www.uspto.gov/web/menu/pbmethod/aiplapaper.rtf> [Accessed 8 September 2009]. In the paper, the authors also stated: not all business method claims are classified in class 705... other process claims which may be labelled a "business method" are classified and examined according to their technology. However, the prevailing view regards business method as USPTO's Class 705 in US patent practice. See also Moskowitz, L. & Mehta, M. H., 2003. Business Method Patents in the United States: a legislative response. [online] Available at <http://www.sughrue.com/files/Publication/ad4f7d49-7146-4a7d-a654-f04bad76ee73/Presentation/PublicationAttachment/e3c598ec-5f61-4013-addf-033ad58502e6/businessMethodPatentspart2_FINAL%281%29.pdf> [accessed 3 October 2009]

²⁰ Class 705, USPTO. [online] Available at < <http://www.uspto.gov/web/patents/classification/uspc705/defs705.htm>> [accessed 3 October 2008]

²¹ The guidelines are compiled into the U.S. Patent Classification System (USPC) created by USPTO. USPC gives each class definition according to the various guidelines. The classification definitions can be searched in the USPTO Website, [online] Available at <<http://www.uspto.gov/web/patents/classification/index.htm>> [accessed 8 July 2011]

²² Class 705, USPTO. [online] Available at <<http://www.uspto.gov/web/patents/classification/uspc705/defs705.htm>> [accessed 3 October 2008]

regarded as these which resolve problems relating to administration of an organization, commodities or financial transactions.

Business functions however are not only limited to the resolution of “problems relating to administration of an organization, commodities or financial transactions”. Business functions include other specialisms that carry out a part of the mission of an organization such as advertising, marketing, training etc. Therefore, more recently the US Business Method Patent Improvement Act of 2001 has attempted to define business methods more widely as follows: "(f) The term of business method means: (1) a method (A) of (i) processing data; or (ii) performing calculation operations; and (B) which is uniquely designed for utilized in the practice, administration, or management of an enterprise; (2) any technique used in athletics, instruction, or personal skills; and (3) any computer-assisted implementation of a method described in paragraph (1) or a technique described in paragraph (2). (g) The term 'business method invention' means: (1) any invention which is a business method (including any software or other apparatus); and (2) any invention which is comprised of any claim that is a business method".²³ It is of course possible that patents we might view as business method patents are classified elsewhere in the US patent system, i.e. in classes other than Class 705. For example, patent number 5,854,117, which describes a training system for training janitors, is classified in Class 434, "education and demonstration". Another example is the US patent number 6,015,947, which is a patent on a method of teaching music and is classified under Class 84, "music"²⁴. So the scope of possible BMPs is in fact quite broad. Class 705 remains the most common of the classes in which business method patent applications are made.

²³ Business Method Patent Improvement Act of 2001. [online] Available at <<http://www.govtrack.us/congress/billtext.xpd?bill=h107-1332>> [accessed on 7 March 2008]

²⁴ See also U.S. Patent No. 5,978,463 (entitled "Reservation Scheduling System for Audio Conferencing Resources"); U.S. Patent No. 6,138,130 (entitled "System and Method for Processing Data in an Electronic Spreadsheet in Accordance With a Data Type"); U.S. Patent No. 6,097,834 (entitled "Financial Transaction Processing Systems and Methods") etc..

1.3.2 The definition of business method in European practice

In Europe, the current law does not contain a legal definition of the term “business method” although the term “methods for doing business” is given a statutory definition as provided for Article 52 (2) (c) European Patent Convention (EPC), which read as follows: “(2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1 ... (c) Schemes, rules and **methods** for performing mental acts, playing games or **doing business**, and programs for computers”. In 2000, the European Patent Office (EPO) in one of its publications, *Examination of “Business Method” Applications*,²⁵ defined “business method” with “functions” plus “implement approaches” language. EPO suggested that a business method is any subject matter which is “concerned more with interpersonal, societal and financial relationships, than with the stuff of engineering - thus for example, valuation of assets, advertising, teaching, choosing among candidates for a job, etc.”²⁶. The publication also indicated “Claims for business methods can be divided into three groups: (1) claims for a method of doing business in abstract, i.e. not specifying any apparatus used in carrying out the method; (2) claims which specify computers, computer networks or other conventional programmable digital apparatus for carrying out at least some of the steps of the business method (“computer-implemented business methods”); (3) claims which specify other apparatus (perhaps in addition to computers) e.g. mobile telephones”²⁷. However, these definitions of this proposal have been rejected as amendment to the EPC²⁸. The specific business functions of “business method” in the definition are “valuation of assets, advertising,

²⁵ EPO 2000/05/19: Examination of “business method” applications. This document is a appendix of a report in which the EPO explains to the US and Japanese Patent Office to what extent it has made progress in working around the European Patent Convention so as to make business methods patentable in Europe. This document became the basis of the European Commission’s software patentability directive proposal of 2002/02/20.

²⁶ Ibid, at page 3.

²⁷ Ibid, at page 3.

²⁸ The document, Examination of “business method” applications was the basis of the European Commission's software patentability directive proposal of 2002/02/20. Following several years of debate and numerous conflicting amendments to the proposal, the proposal was rejected on 6 July 2005 by the European Parliament by an overwhelming majority 648 to 14 votes.

teaching, choosing among candidates for a job and others concerned with interpersonal, societal and financial relationships". The implement approaches of "business method" addressed by the EPO are computers, computer networks, other conventional programmable digital apparatus, or other specific apparatus, and as well as without any apparatus.

1.3.3 The definition of business method in academia

In academic discussions, to conduct the research related business method the various concepts of "business method" have been defined in different ways.

In 2000 the UK Patent law scholars, Michal Likhovski, Michael Spence and Michael Molineaux, carried out a research project²⁹ to find out what restrictions have made in patenting business method in Europe. Although the authors realized that a clarified concept of business methods was essential to any legal analysis of the problems of patenting business method inventions in Europe, yet in the study they merely specified the concept of "business method" by types of business activities are business methods which could be patented and thus avoid the difficulty of giving a definition of "business method". "For current purposes, business methods include such things as: methods of gauging consumer habits, methods of marketing, methods of inducing consumers to buy, methods of charging for goods or services, methods of accounting, methods of creating new markets and trading, methods of distributing products or services, generalised methods of production and manufacturing (such as the idea of using an assembly line, or the idea of "just-in-time" production)"³⁰. These examples give a description about the functional uses of numerous business methods.

²⁹ Likhovski, M., Spence, M. & Molineaux, M., 2000. *The First Mover Monopoly –A study on patenting business methods in Europe*. Oxford University: Olswang and Oxford Intellectual Property Research Centre.

³⁰ Ibid, at page 2.

However, a definition by the way of examples will not cover every possible situation for related business method patents. Thus, professor Hirashima (2000) attempted to define the concept of “business method” by distinguishing a difference between business methods and other methods / processes in his research for examining the practical and theoretical measures sought under the US patent law regarding business method – related inventions. He defined "business method inventions" as "inventions that are embodied or applied not in the industrial field in the general sense, but in commercial areas of industry centring on financial and service transactions."³¹ This definition restricts the purpose of "business method" to certain commercial areas not industrial field in the general sense.

Professor Merges (1999) described the emergence of patents for business methods in his research: *As Many As Six Impossible Patents Before Breakfast - Property Rights for Business Concepts and Patent System Reform*. To get right to the heart of the issues surrounding patents for business methods the author indicated that to understand what business method is and to distinguish whether a method is a "business method" we should examine both the purpose of the method and the means of conducting the method. He says that if a method, "(1) describes an essentially commercial (as opposed to purely technological) activity, typically some way to make or save money; and (2) the hardware and software elements are described and claimed [in the method]",³² such a method will be a "business method" invention.

1.3.4 Summary

³¹ Hirashima, R., 2000. Changes in Subject Matter under the US Patent Law - Focusing on the so-called "business method exception". Japan: Institute of Intellectual Property. at page 3.

³² Merges, R. P., 1999. As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform. *Berkeley technology law journal*, **14**, pp. 577-615, at page.577.

Reviewing these definitions in the statutory in Europe and the US and in academic discussion, we find that although the existing definition are not unified, yet all of them emphasise one or more than one of the following attributes: (1) the purpose of the "business method"; (2) the classification of the "business method"; (3) the implementation of the "business method". They thus help people to understand what is the meaning of "business method" in the relevant discussions.

The purpose of a business method is obviously for conducting particular types of commerce as it is a method for doing such "business"³³. The types of these commercial activities include but are not limited to: delivering services or products to customers; automating financial decisions; organizing accounting methods and product mixes; training and teaching employees; advertising products and coordinating procurement decisions among input suppliers³⁴. According the groups of claims for business methods provided by EPO and USPTO, the "functions" of "business method" may be divided into two categories: (1) methods that increase productivity or reduce organizational or production costs in a firm, which will be referred to as administrative method in the research; (2) methods related to pricing, advertising or other product concerned with customers' service, which will be called customers service method. Currently, the ways of implementing these business functions³⁵ include: (1) purely manual procedures, e.g. bookkeeping; (2) by way of implementing with tangible apparatus (mechanics or electronics), e.g. by computer. (3) by means of implementing with intangible apparatus, by which may be specified software³⁶ which could

³³ See also the definition provided by Hirashima, R., (2000), Merges, R. P. (1999). Supra footnotes 30 & 31.

³⁴ Summarized from the definition provided by USPTO, US Business Method Patent Improvement Act of 2001, EPO (2000), Likhovski *et al.* (2000), Supra footnotes 21, 22, 24 & 28.

³⁵ See the definition provided by EPO (2000), Merges, R. P. (1999). Supra footnotes 24 & 31.

³⁶ See the 1996 English Court of Appeal case, *St Albans City and District Council v. International Computer Ltd*, [1996] 4 All ER 481, where Sir Iain Glidewell concluded that computer programs ... [is] intangible instructions, were not goods. See also the 1994 decision of the Louisiana Court of Appeal in *South Central Bell Telephone Co v. Barthelemy*, 643 So. 2d,

be developed using new information technology in the future. In this research, according to the current technology, the intangible apparatus will be limited to software applications.

Thus, according to the above analyses, in this thesis, except where the specific context (e.g. cases, statutes, provisions otherwise suggests), "business method" will be understood as: "a method, based on commercial interests, to conduct administration or customer service implemented with or without one or more tangible apparatuses, intangible apparatuses, or the combination of tangible and intangible apparatuses, based on commercial interests".

Thus, a business method - related invention could be (1) a physical entity, combined or not combined with intangible apparatus, which is used to conduct administration or customer service, wherein the business method itself is or isn't claimed when the invention is applied to patent protection ("business method - related physical entity invention"), or (2) an intangible apparatus (e.g. a specific software) which is used to conduct administration or customer service, wherein the business method itself is or isn't claimed when the invention is applied to patent protection ("business method p related intangible apparatus invention"), or (3) a process of conducting administration or customer service implemented with tangible or intangible apparatus, wherein the tangible or intangible apparatus is regarded as a "means" to conduct the method ("business method process implemented with tangible or intangible apparatus invention"), or (4) a process of conducting administration or customer service implemented without any tangible or intangible apparatus ("pure business method invention").

1240 (LA 1994), where the court decided software was tangible property. Whether software is tangible or intangible could still be in the controversy. However, the question is not the emphasis of the research. Hence, in the research, the author will accept the opinion of English Court of Appeal and regard software as an intangible apparatus.

1.4 Historic Origins and the Purpose of Patent Law

As section 1.1 indicated, one of the purposes of the research is to justify whether business method – related inventions are worth being patented, i.e. whether business method – related inventions should be drawn into patentable subject matter. To achieve this purpose, it is necessary to understand what the criteria of “worth” are in patent system. However, the criteria of “worth” are intricately defined. Nevertheless a worthy patentable category at least should achieve the purpose of patent law. Thus, to justify whether business method inventions shall be drawn to patentable subject matter, it is important to understand the purpose of the patent, which can be concluded from the patent history.

1.4.1 Early history

The first recorded reference to the formation of intellectual property rights, especially patents, can be traced back to the proposal which is called for by Hippodamos in the fourth century B.C.³⁷. According to Aristotle in his book, *The Politics*, Hippodamos of Miletus was an ancient Greek Architect, Urban Planner, Physician, Mathematician, Meteorologist and Philosopher. He proposed that "society should reward those individuals who create things useful for society"³⁸. The system of rewards to those who discover things useful to the state could be the earliest notion that came to be used in patent law. However, Aristotle opposed the view: "Concerning the matter of those who discover something advantageous for the city, to legislate that they receive some honor is not safe, though it sounds appealing; it would involve harassments and, it might well happen, change of regimes"³⁹. However, as Merges

³⁷ Merges, R. P., 1991. On the Origins of Patent Law. [online] Available at <<http://www.gatewaycoalition.org/files/patents/site/pdf/doc6.pdf>> [accessed on 5 August 2008]

³⁸ Lord, C., 1984. *Aristotle: The Politics*. Chicago, US: University of Chicago Press, at page 38.

³⁹ *Ibid.* at page.39.

(1991) concluded, the main reason that Aristotle opposed the proposal based "law should not change too quickly because too rapid change will weak the habit of obedience to law that is so valuable to a state"⁴⁰. Another reason to oppose the proposal centred around the notion of the "good". Hippodamos pointed out that the state honour the architects of useful inventions, as this honouring, along with official recognition and state protection, would enable society as a whole to benefit from additional innovations by encouraging inventors to come forward and produce their inventions for the good of society. However, according to Aristotle, "the better state is one where citizens obey the law not because it is in their interest, but because it is good in itself to do so"⁴¹. In another words, Hippodamos believed that by rewarding individuals for doing good, the individuals will do good for the reward over the benefit of the state. In contrast, Aristotle felt that this was pandering to a mercenary motive and that citizens should seek to perfect the pure good in itself and that therefore the mercenary motive was a corruption. In his view if Hippodamos were to be followed, then the state could actually suffer because of the allure of individual rewards, since individuals may propose notions that weaken the state as a common wealth. The proposal of Hippodamos only sought individual honours, rather than the health of the community, which could result in the community suffering. Taken in this sense, the viewpoint of Aristotle in fact foreshadowed the inherent tension between private rewards as opposed to social benefits – a potential conflict between individual and societal interests.

It was not until the 15th century that there was a formal protection of inventions, and patents clearly entered the legal sphere⁴². The reason for this may be that during that period manual labour was carried out largely by slaves and was not deemed a worthy activity for educated

⁴⁰ Merges, R. P., 1991. On the Origins of Patent Law. [online] Available at [_<http://www.gatewaycoalition.org/files/patents/site/pdf/doc6.pdf>](http://www.gatewaycoalition.org/files/patents/site/pdf/doc6.pdf) [accessed on 5 August 2008].

⁴¹ Lord, C., 1984. *Aristotle: The Politics*. Chicago, US: University of Chicago Press, at page 39.

⁴² Merges, R. P., 1991. On the Origins of Patent Law. [online] Available at <http://www.gatewaycoalition.org/files/patents/site/pdf/doc6.pdf> [accessed on 5 August 2008].

men. Consequently, those who, through their education, were the most likely source of technological progress had little or no interest in it. As a result it was only mercantile or trade institutions, notably guilds, which monitored competition and ensured some sharing of know-how and technology among their members, while denying non-members access to that pool of knowledge. Even the transmission of knowledge in trade first took family channels⁴³. The situation resulted in innovation being deterred because the general diffusion of knowledge was restricted.

To attract foreign craftsmen to perform their art and train local workers in the city, some privileges which rewarded inventions were granted in the cities of northern Italy by the late middle ages. The first true patent was claimed to be granted on February 20, 1416 to Franciscus Petri, a citizen of the Greek island of Rhodes.⁴⁴ It was granted because the device, "structures with pestles for fulling fabrics", is "better than that of the usual devices and different therefrom and his device is superior to the usual fulling devices and better than the same."⁴⁵ This was obviously an invented device which showed novelty and an inventive solution to a practical problem in dyeing fabrics. Another example of early privileges was the famous Brunelleschi patent for a system that would transport marble on the Arno River, which patent was granted by the city of Florence in 1426⁴⁶. This patent comprised a type of boat capable for the first time of transporting very substantial loads of marble on the river. Previous boat designs were not capable of doing this. Brunelleschi patent once again overcame an existing practical difficulty by means of a novel innovative solution. Both these patents were "explicitly utilized to promote innovation"⁴⁷.

⁴³ Guellec, D., & Potterie, B. V., 2007. *The Economics of the European Patent System: IP policy for innovation and competition*. Oxford: Oxford University Press.

⁴⁴ Mandich, G., 1960. Venetian Origins of Inventors' Rights. *The journal of patent office society*, **42**, pp. 378-382.

⁴⁵ Ibid. at page 379.

⁴⁶ Guellec, D., & Potterie, B. V., 2007. *The Economics of the European Patent System: IP policy for innovation and competition*. Oxford: Oxford University Press, at page 16.

⁴⁷ May, C., 2002. The Venetian Moment: New Technologies, Legal Innovation and the Institutional Origins of Intellectual

However, it is fair to say that at this stage patents were granted according to customary trade rules and long-held trade practices rather than by means of systematic legal rules of general application. The increasing demands for protecting valuable knowledge by means other than customary rules or guild practice of keeping knowledge secret eventually gathered political momentum. Thus, the early practices were formalized in the first patent code: the patent statute of Venice issued in 1474 in the Republic of Venice, a city largely controlled by merchants and industrialists, and which code afforded clever inventors a limited monopoly on their inventive contribution. The statute laid out the important features of later patent systems⁴⁸. The statute reads: "We have among us men of great genius, apt to invent and discover ingenious devices; and in view of the grandeur and virtue of our City, more such men come to us every day from diverse parts. Now if provision were made for the works and devices discovered by such persons, so that others who may see them could not build them and take the inventor's honour away, more men would then apply their genius, would discover and would build devices of great utility and benefit to our common wealth. Therefore: BE IT ENACTED: that, by the authority of this Council, every person who shall build any new and ingenious device in this City, not previously made in this commonwealth, shall give notice of it to the office of our General Welfare Board when it has been reduced to perfection so that it can be used and operated. It being forbidden to make any further device conforming with and similar to said one, without the consent and license of the author, for the term of 10 years. And if anybody builds it in violation hereof, the aforesaid author and

Property. *Prometheus Critical Studies in Innovation*, **20** (2), pp. 159-179.

⁴⁸ Some of the features still characterize current systems: (1) A patent is defined as a right to exclude. (2) The aim of the system is to incentivize invention and import of new techniques. (3) Patented techniques should be new to Venice ('out dominion'), not necessarily to the entire world. (4) The invention should be practical ('reduced to perfection'): no patents shall be given on mere ideas or scientific discoveries. (5) There is examination of the patent application (by the 'office of our General Welfare Board'). The usefulness of the invention to the Venetian economy is the primary criterion for assessing its patentability. (6) The duration is standardized (to ten years). (7) In case of alleged infringement, the patentee will go to court. See Guellec, D., & Potterie, B. V., 2007. *The Economics of the European Patent System: IP policy for innovation and competition*. Oxford: Oxford University Press.

inventor shall be entitled to have him summoned before any Magistrate of this City, by which Magistrate the said infringer shall be constrained to pay him hundred ducats; and the device shall be destroyed at once. It being, however, within the power and discretion of the Government, in its activities, to take and use any such device and instrument, with this condition however that no one but the author shall operate it."⁴⁹ By granting a ten year monopoly on the use and application of any useful new device to the one who first introduced the device into Venice, the Venetian authority anticipated the foreign engineers would be attracted to the city⁵⁰ and would develop inventions in Venice rather than attempting to use their advancements in secret⁵¹. Also, because local inventors were explicitly rewarded in the system, the purpose of the statute is not only to capture existing techniques, but to create new ones domestically⁵². Thus, Venetian society benefited because the statute promoted the introduction and open use of new technologies.

With the demise of Venice, its artisans were absorbed in other Italian city-states and gradually in France, Germany, Holland, Belgium and England.⁵³ They took with them the idea of statutory or patronal trade protections which developed eventually into patent laws.

1.4.2 English patent history

Although the first patent statute was enacted in Venice, a common law patent system

⁴⁹ Venetian Patent Statute of 1474.

⁵⁰ Kaufer, E., 1989. *The Economics of Patent System*. Chur, Switzerland: Harwood Academic Publishers.

⁵¹ Choate, R. A., & Francis, W. H., 1973. *Cases and Materials on Patent Law*. St. Paul, US: West Publishing.

⁵² Guellec, D., & Potterie, B. V., 2007. *The Economics of the European Patent System: IP policy for innovation and competition*. Oxford: Oxford University Press. at page 17

⁵³ Prager, F. D., 1944. A History of Intellectual Property from 1545 to 1787. *Journal of the Patent Office Society*, **26**, pp. 711-759. In this paper, the author stated: "In most places, the patent system was adopted almost exactly as developed in Venice... All of the basic patent rules developed in Venice were preserved in the subsequent systems ... and including American system."

originated independently, or so it seems, in England.⁵⁴ In the middle ages, due to the fact that English manufacturing arts were behind those in continental European countries, early English Kings exercised the prerogative of granting special patronal privileges⁵⁵, in order to encourage foreign craftsmen to bring new manufactures to England. For examples, in 1324, Edward II granted letters of protection (not yet patents) to skilled German miners to entice them to bring new mining technologies to England; and to teach their skills to native craftsmen, thus helping establish new industries in England.⁵⁶ However, the effect of the law was “merely an invitation to a foreigner to come to England... and not [yet to create] a monopoly”⁵⁷. The earliest known instance of royal trade protection for foreign craftsman, issued to a foreigner by the English Crown, was granted to John Kempe, who came from Flanders, and to his company of Flemish Weavers,⁵⁸ for introducing method of woven cloth making into England⁵⁹ in 1331. Such Royal Letter Patent soon extended to statutory formulae for in 1337, a statute was enacted that gave all cloth workers from other countries special franchises and privileges if they settled in England to practice and teach their crafts.

At this stage, the prerogative granted to the craftsmen by the Crown, were not monopolies but merely special privileges, such as “financial incentives, favourable tax treatment, sovereign protection, and franchises (i.e., the right to practice the trade or industry)”⁶⁰. The present patent monopoly system in England is generally agreed to originate with the reign of Queen Elizabeth I between 1558 and 1603⁶¹. In 1559, Jacobus Acontion of Italy petitioned Queen

⁵⁴ Thorley, S., Miller, R., Burkill, G. & Birss, C., 2006. *Terrell on the Law of Patents*. 16th ed. London: Sweet & Maxwell.

⁵⁵ Ibid.

⁵⁶ Klitzke, R. A., 1959. Historical Background of the English Patent Law. *Journal of the Patent Office Society*, **41**(9), pp. 619-650.

⁵⁷ Ibid. at page 627

⁵⁸ May, C., & Sell, S. K., 2006. *Intellectual Property Rights: A Critical History*. Boulder, US : Lynne Rienners.

⁵⁹ Hill, T. A., 1924. Origin and Development of Letters Patent for Invention. *Journal of the Patent Office Society*, **6**, pp. 405-422.

⁶⁰ Walterscheid, E. C., 1994. The Early Evolution of the United States Patent Law: Antecedents (Part1). *Journal of the Patent & Trademark Office Society*, **75**, pp. 697-715.

⁶¹ See, Thorley, S., Miller, R., Burkill, G. & Birss, C., 2006. *Terrell on the Law of Patents*. 16th ed. London: Sweet & Maxwell, at page 2. In the paper the author stated “the origin of the present patent system is to be found in the ‘Monopoly

Elizabeth I for the protection of his inventions out of fear that his work might be copied by others without royal protection. Acontion's request was agreed by Queen Elizabeth I. The Queen instituted a system of royal privileges, which gave a "monopoly of limited duration that would compensate the new technology's importer for the cost of transplanting the technology, learning to use it, and making it profitable,"⁶² which was significantly different from previous prerogative granted by the Crown.

Under the monarchs of Elizabeth I and James I monopoly patents induced the introduction and importation of new manufacture into England. Also, it "provide[d] employment for those who were not members of the guilds"⁶³. The local-working requirement created employment opportunities either through hiring local workers in the newly established industry or through training apprentices.⁶⁴ Therefore, it stipulated in the patent grant a requirement for employing English workers. This requirement ensured that the innovation would remain available within trades within the Realm and so far the good of society as a whole.

However, at this stage, the grant of such monopolies by the sovereign was attributed to an exercise of the royal prerogative and was thus subject to arbitrary, discriminatory and unpredictable exercise by the state. When the Crown found they could get support from the influential monopolists and share directly in monopoly profits, the Crown granted monopolies by letters patent with no regard for the origins of an invention, as well as with no limitation of the duration of the monopoly. Thus, influential merchants, in order to control the British market in a particular product, sought and secured monopolies for such products,

system' ... in the reign of Queen Elizabeth." See also, Baker, J. H., 1990. *An Introduction to English Legal History*. 3rd ed., London: Butterworths. Frumkin, M., 1947. Early History of Patents for Invention. *Transaction of the Newcomen Society*, **26**, pp. 47-56.

⁶² Marlin-Bennett, R., 2004. *Knowledge Power: Intellectual Property, Information and Privacy*. London: Lynne Rienner, at page 25.

⁶³ Hill, T. A., 1924. Origin and Development of Letters Patent for Invention. *Journal of the Patent Office Society*, **6**, pp. 405-422, at page 407.

⁶⁴ Dent, C., 2006. Patent Policy in Early Modern England: Jobs, Trade and Regulation. *Legal History*, **10**, pp. 71-95.

granted in letters patent, which became widely resented as an abusive use of the Royal prerogative. In 1601, a declaratory bill, entitled "An Act for the Explanation of the Common Law in Certain Cases of Letters Patent", was introduced into Parliament for the purpose of abolishing patent monopolies. When the prerogative of the Crown was threatened to be taken away by the Parliament, Queen Elizabeth defended her prerogative before Parliament on November 30, 1601.⁶⁵ After one of the most significant wrangle in British constitutional history⁶⁶, Elizabeth I reached a compromise with Parliament: "the bill would be withdrawn from Parliament in exchange for an undertaking on her part thenceforth to allow the validity of patents to be tried in the common law courts."⁶⁷ The submission of the Queen's patent grants to the scrutiny of the English court system marked the beginning of the transformation of English patent custom into English patent law.⁶⁸

The purpose of the patent system in England at that time was explained by Francis Bacon (1601): "If any man out of his own wit, industry or endeavor, finds out anything beneficial for the commonwealth, or bring any new invention which every subject of this Realm may use; yet in regard of his pains, travail, and charges therein, Her Majesty is pleased to grant him a privilege to use the same only by himself, or his deputies, for a certain time."⁶⁹ This formed the argument later in the landmark Case of Monopolies, i.e. Darcy v. Allen.

⁶⁵ Ramsey, G., 1936. The Historical Background of Patents. *Journal of the Patent Office Society*, **18**, pp. 6-21. At page 8, the author cited the words said by the Queen Elizabeth: "Since I was Queen, yet did I never put my pen to any grant but upon pretext and semblance made to me that it was for the good and avail of my subjects generally, though a private profit to some of my ancient servants who have deserved well; but that my grant shall be made grievances unto my people, and oppressions be privileged under color of our patents, our princely dignity will not suffer it ... And if my princely bounty has been abused, and my grants turned to hurt by my people, contrary to my will and meaning, or if any authority under me has been neglected or converted what I have committed unto them, I hope God will not lay their culps to my Charge."

⁶⁶ Inlow, B. E., 1950. *The Patent Grant*. Baltimore, US: John Hopkins Press.

⁶⁷ Loughlan, P., 1998. Patnets: Breaking into the Loop. *The Sydney Law Review*, **20**, pp. 553-578, at page 558.

⁶⁸ Walterscheid, E. C., 1994. The Early Evolution of the United States Patent Law: Antecedents (Part 2). *Journal of the Patent Office Society*, **76**(1), pp. 849-880. The author maintains that the level or degree of involvement of legal substance is what separates "patent law" and "patent custom" or "patent practice".

⁶⁹ Groff, E. L., 1958 Misinterpretation of Statute of Monopolies. *Journal of the Patent Office Society*, **40**, pp.367-369, at page 368.

In Darcy v. Allen⁷⁰ (the "case of monopolies") the grantee of a monopoly over the import, making and sale of playing cards in England sought to enforce that monopoly against an alleged infringer. The court refused to uphold the monopoly, ruling that such monopolies over items of trade and commerce were void and contrary to the common law as they were destructive of trade and the common welfare. The court also noted, however, that some monopolies granted by Royal prerogative under letters patent were not void. These included cases:

"When any man by his own charge and industry, or by his own wit or invention, doth bring any new trade into the realm, or any engine tending to the furtherance of a trade, that never was used before, - and that for the good of the realm, - that in such cases the King may grant to him a monopoly patent for some reasonable time, until the subjects may learn the same, in consideration of the good that he doth bring by his invention to the Commonwealth; otherwise not."⁷¹

This case effectively placed limitations on the sovereign prerogative of granting patent monopoly privileges, and signalled the beginning of the end of the prerogative monopoly system.

In 1623, due to the patent grant failing in its original policy objective of encouraging invention and promoting the public good⁷², Parliament and House of Lords regulated the practice and passed the Statute of Monopolies with respect to the deeming of all granted monopolies to be void and unenforceable, and with respect to the exception for limited monopolies granted to those who introduced new technology into the realm:

"[G]rants [made] of [the] privilege, for the term of one and twenty years or under... of

⁷⁰ *Darcy v. Allen* (1599) 74 E.R 1131

⁷¹ *Ibid.*

⁷² Vaver, D., 2006. *Intellectual Property Rights: Critical Concepts in Law. Volume I.* London: Routledge.

the sole working or making of any manner of new manufacture, within this realm, to the first and true inventor or inventors of such manufactures, which others at the time of the making of such letters-patent and grants did not use, [if] they be not contrary to the law, nor mischievous to the state, by raising of the price of commodities at home, or hurt of trade, or generally inconvenient."⁷³

The statute is regarded as the foundation of English Patent law⁷⁴, which is a landmark in the development of the modern patent system.

It should be noted that "the true and first inventor" in the statute should be interpreted as meaning the first introducer of a new technology into the realm not the first inventor in worldwide. "If the invention be new in England, a patent may be granted, though the thing was practised beyond the sea before; for the statute speaks of new manufactures within this realm; so that if they be new here, it is within the statute; for the Act intended to encourage new devices useful to the kingdom, and whether learned by travel or by study, it is the same thing."⁷⁵

The term of Twenty-one years were later reduced to fourteen years. The duration was set according to the length of apprenticeships. Most apprenticeships lasted for 7 years. Machlup (1958) explains that patent duration historically has been determined through a process of political compromise: "The duration of patents has been determined by historical precedent and political compromise. The 14-year term of the English patents after 1624 was based on the idea that 2 sets of apprentices should, in 7 years each, be trained in the new techniques, though a prolongation by another 7 years was to be allowed in exceptional cases. There were

⁷³ Statute of Monopolies (1624)

⁷⁴ Holdsworth, W. S., 1937. *A History of English Law. Volume 4*. London: Methuen.

⁷⁵ *Edgeberry v. Stephens*, (1693) 2 Salk. 447

all sorts of arguments in later years in favor of a longer period of protection: it should be long enough to protect the inventor for the rest of his life; to protect him for the average length of time for which a user of an invention might succeed in keeping it secret; or for the average time it would take for others to come up with the same invention; or for the average period in which investments of this kind can be amortized; and some pleas were made for eternal protection through perpetual patents.”⁷⁶

The statute demonstrated clearly that it "was an instrument of economic policy; rather than being motivated by the desire to do justice to the inventor, it was meant to encourage industry, employment and growth. The patentee's consideration for the grant was that he would put the invention to use."⁷⁷ Hence, the purpose of the statute were to encourage industrial activity, employment and economic growth, rather than to reward the "true and first inventor" for his effort. The statute provided that patents shall not being contrary to law or "mischievous to the state". The Statute also stated that monopolies are contrary to the "ancient and fundamental laws" of the realm and exempted patent monopolies by virtue of a privilege on the basis of their contribution to the public good.

1.4.3 American history

It is generally regarded that the US was an importer of European technology from the colonial period to the early nineteenth century. Historian Doron Ben-Atar demonstrates that the US in its earliest years as a new nation was an active appropriator of industrialized Europe's technological know-how, which was used to develop a thriving indigenous

⁷⁶ Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: The United States Government Printing Office, at page 3.

⁷⁷ Takenaka, T., 2008. *Patent Law and Theory: A Handbook of Contemporary Research*. Cheltenham: Edward Elgar, at page 103.

manufacturing capability.⁷⁸ One of the main economic policies at that time was to attract skilled European artisans to emigrate into the US who would bring with them their industrial and technological know-how.⁷⁹ Along with the immigrants, the trend of providing inventors legal monopolies over their inventions also gradually spread from Europe to the US.

In the US, the first patent was granted by the Massachusetts Colony in 1641 to Samuel Winslow for a method of making salt.⁸⁰ In fact, before the Constitutional Convention in 1787, a "Statute of Monopolies-type" law was passed in the Colony of Connecticut in 1672.⁸¹ The law stated: "there shall be no monopoly granted or allowed amongst us, but of such new inventions as shall be adjudged profitable to the country, and for such times as the General Court shall deem meet."⁸²

Upon secession from England, following existing laws in some of the 13 founding states (e.g., Maine, Massachusetts, South Carolina), the United States Constitution (1787) gave Congress the power to enact patent legislation:

"To promote the progress of science and useful arts by securing for limited times to author and inventors the exclusive right to their respective writings and discoveries."⁸³

This is the oldest element of the U.S. Technology policy⁸⁴, which is known as the copyright and patent clause.

⁷⁸ Gallagher, W. T., 2009. What is a "Law and Society" Approach to Intellectual Property? [online] Available at <<http://digitalcommons.law.ggu.edu/cgi/viewcontent.cgi?article=1029&context=pubs>> [accessed 3 October 2010].

⁷⁹ Syrett, H. C., 1966. *The Papers of Alexander Hamilton, vol. 10*. Columbia, US: US Columbia University Press. Alexander Hamilton is then Treasury Secretary. In his "Report on the Subject of Manufactures", which was submitted to Congress, the statement was presented.

⁸⁰ Ramsey, G., 1936. The Historical Background of Patents. *Journal of the Patent Office Society*, **18**, pp. 6-21.

⁸¹ Ibid.

⁸² Ibid.

⁸³ Article I, Section 8, Clause 8. of the United States Constitution.

⁸⁴ Cohen, W. M., & Merrill, S. A., 2003. *Patents in the Knowledge-Based Economy*. Washington, US: National Academy Press.

In McClurg v. Kingsland (1843),⁸⁵ the U.S. Supreme Court interpreted the "powers of the Congress" as to patents. Justice Baldwin wrote:

"The Powers of Congress to legislate upon the subjects of patents is plenary by the terms of the Constitution, and as there are no restraints on its exercise, there can be no limitation of their right to modify them at their pleasure so they do not take away the rights of patents and existing patents."

In 1790 the US patent system was established by the patent act of 1790 with a basis in the Constitution (1787). However, the US patent rights were different from monopoly rights of England. The US patent rights were actually conceptualized in terms of the inventor's common-law property rights, whereas the patent rights of England were privileges granted by the sovereign. Thus, as a doctrinal matter, English patents were not strictly transferable. They could not be sold and devised unless the Crown granted an exception and permitted them to do so.⁸⁶ The privileges also implied that the English Crown / government can use the patented invention without authorization from the patentee.⁸⁷

In McKeever v. United States (1883)⁸⁸, Justice Nott distinguished the American patent system from the British patent system: "But it [Statute of Monopolies] neither recognizes an invention as property nor declares the right of a truly first inventor to acquire a patent ... A patent in England is nothing more than a grant dependent in contemplation at law upon Royal favor, and subject to the general implication of all grants wherein the control has not expressed, that they shall not exclude a user by the Crown. In this country, on the contrary, our organic law recognizes in the clearest terms that mind work which we term invention.

⁸⁵ *McClurg v. Kingsland* 42.U.S. 202 (1843)

⁸⁶ Mossoff, A., 2007. Who Cares What Thomas Jefferson Thought About Patents? Reevaluating the Patent "Privilege" in Historical Context. *Cornell Law Review*, 92(5), pp. 953-1012.

⁸⁷ *Feathers v. The Queen* (1865) 6 B&S 257.

⁸⁸ *McKeever v. United States* 14 Ct. Cl.396 (1883).

Instead of placing our patent system upon the English foundation of executive favor and conferring that prerogative of the Crown upon the President, they transferred all authority to the Legislative Department of the Government - the department which regulates rights - by placing it among the specially enumerated powers of Congress."

The transferable exclusive right awarded to the inventor created a dynamic market for the exchange of technological information⁸⁹, which encouraged socially beneficial innovation and technological progress. As Lincoln (1859) stated: " the patent system changed this; secured to the inventor, for a limited time, the exclusive use of his invention; and thereby added the fuel of interest to the fire of genius, in the discovery and production of new and useful things."⁹⁰

From 1790, Congress has used the mandate from constitution to enact various patent laws. The later amendments to the initial legislation especially the addition of an examination for meeting the requirements of novelty, gave American patents even further legal validity and economic value.

The current basic structure of the United States patent law was adopted in 1952, which can be found in Title 35 of the United States Code (35 U.S.C). Throughout the revisions of this Patent Act, Congress upheld the broad terms contained within the first Patent Act of 1790. In Particular, during the 1952 revision of the patent statute, Congress underlined the necessity of broad language and unequivocally maintained that the Patent Act was a tool for the promotion of science and a tool for the encouragement of inventiveness in all fields of

⁸⁹ Sokoloff, K. L., & Khan, B. A., 1990. The Democratization of Invention during Early Industrialization: Evidence from the United States, 1790-1846. *The Journal of Economic History*, **50**(2), pp. 363-378.

⁹⁰ Lincoln, A., 1859. Second Lecture on Discoveries and Inventions. [online] Available at <<http://www3.northern.edu/schaff/Spring2007/Second%20Lecture%20on%20Discoveries%20and%20Inventions.pdf>> [accessed 3 July 2009]

science and technology⁹¹. In the United States, patent awards originated from the state's constitutionally recognized interest in the advancement of science and in the promotion of all science and all inventions for the benefit of society.

The other sources of the U.S. patent system include the USPTO Regulations (37 CFR), the Manual of Patent Examining Procedure (MPEP), the case law of the Supreme Court and the case law of the Court of Appeals For the Federal Circuit⁹² (CAFC).

1.4.4 Europe

In the 19th century, the expansion of cross-border economic relationships - flows of goods, capital, and technology, pushed for international harmonization. However, in the patent field in the countries which had patent provisions, their patent laws discriminated against foreigners. For example, in France until 1845 patents would not cover imported goods. The goods protected by patent law required that the goods be produced on the national territory. In these circumstances, the harmonization of patent law and practice was essential. In 1883 the first intellectual property treaty was signed in Paris, France, whereby foreign residents should be treated in any country in exactly the same way as nationals.

As part of this harmonization trend, after Europe built its own regional system, in 1949 the Council of Europe advocated the creation of a European Patent Office. The diversity of patent regimes in Europe was seen as an obstacle to the desired market integration which led to the Treaty of Rome. By 1959 discussions started between members of the EC. The Strasbourg

⁹¹ Connor, K. O., 1991. Patenting Animals and Other Living Things. *Southern California Law Review*, **65**(1), pp. 597-622.

⁹² The Court of Appeals for the Federal Circuit was created by Congress to hear patent appeals from across the country in 1982.

Convention on the Unification of Certain Points of Substantive Law on Patents for Invention was signed in 1963, as a milestone in the process. By that time, in fact, two separate processes were running: a centralized granting procedure for EU members and non-members, and a unified patent system for EU members only.

The former process resulted in a multilateral treaty, the European Patent Convention (EPC) or Convention on the Grant of European Patents, signed on October 5, 1973 in Munich. This provided an autonomous legal system according to which European patents are granted. On October 7, 1977 the EPC Entered into force for the following first countries: Belgium, Germany (then West Germany), France, Luxembourg, Netherlands, Switzerland and United Kingdom. The first patent applications were filed on June 1, 1978. At present the Convention has entered into force for all member states of the EU plus Iceland, Liechtenstein, Monaco, Switzerland and Turkey. On December 13, 2007, the European Patent Convention 2000 (EPC 2000), revised by the Act Revising the Convention on the Grant of European Patens (which was signed in Munich on November 29, 2000), has entered into force.

The patent system is implemented by European Patent Organisation (usually abbreviated EPOrg in order to distinguish it from the European Patent Office), whose executive bodies is the European Patent Office (EPOff). The EPOff, a centralised system effectively administered day-to-day, operates on behalf of all EPC contracting states. Once granted, a European patent becomes equivalent to a bundle of nationally-enforceable, nationally-revocable patents, and national laws apply to it in each country, except for the provision of a time-limited, unified, post-grant opposition procedure. The objective of EPC is “to strengthen co-operation between the states of Europe in respect of the protection of inventions.”⁹³ The EPC's predominant

⁹³ Preamble of the European Patent Convention (1973).

function is to solve the problem of multiple filings in separate member states by introducing a single procedure for the granting of a European patent that is binding on all of the contracting states⁹⁴. The EPC also sets up a system for the adjudication of patent disputes. Appeals in relation to EPO decisions are heard by the EPO "Board of Appeal" and by the "England Board of Appeal", which is the highest court.⁹⁵ However, Infringement actions are handled by the national court, based on national patent law.⁹⁶

According to the official definition of the European Patent Office, a patent is "a legal title granting its holder the right to prevent third parties from commercially exploiting an invention without authorisation".⁹⁷ The purpose of the patent system has been to encourage the making of inventions and the subsequent innovative work that will put those inventions to practical use. The purpose has been to disclose technical inventions for other inventors to use and base their new inventions on, and in that manner move overall technological development onwards. The state gives the inventor an economic monopoly for a limited time in return for a public description of the invention.⁹⁸

1.4.5 Theoretical summary of a patent system's purpose

Looking at the history of the patent system, we can summarise the purpose of a patent is based on public and national interests. The initial purpose of establishing patent system is to attract foreign craftsmen. Also it encourages local innovation through extending protections to local inventors. In addition by patent grants, it can to some extent stipulate the employment

⁹⁴ Ibid.

⁹⁵ Ibid.

⁹⁶ Ibid.

⁹⁷ [source] Available at <<http://www.epo.org/patents/Grant-procedure/About-patents.html>> [accessed 15 June 2009].

⁹⁸ Cornish, W. R., 1989. *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights*. 2nd edition. London: Sweet & Maxwell.

of local workers, establish new local industries and help to balance foreign trade. The patent system also provides an incentive to inventors for the disclosure of the new arts because the exclusive right of "making, using and selling of their inventions" is granted to the inventors and in exchange therefor provides technical knowledge to subsequent inventors thus enabling them to discover and produce new and useful things.

The history of the several centuries also shows that in discussing the patent system natural law rights do not tend to feature. This is unlike discussions relating to other forms of IP rights (e.g. copyright) which embrace natural law forms of human rights or moral entitlements to one's intellectual creation.⁹⁹ With patents, the most important features of discussions relate to encouraging innovation, promoting new technologies, and developing industries, etc., were the most frequent aims. The function and utility of inventions is the primary basis for the patent award. Hence, utilitarianism is a logical backbone to justifying patentable subject matters, which means social utility is an important norm which we can use to discuss whether a new class of innovation can be granted a patent. It can thus be seen that economic implications are one of the main factors in social utility.

1.5 The classical justification of patent protection in philosophy and economics.

The historical origins of patent law have suggested that the main purposes of patent law are to encourage innovation, to provide an incentive to inventors, and also to provide technical knowledge to subsequent inventors through forcing the patent applicant to disclose their invention to the public.

⁹⁹ For example, Article 6bis of Berne Convention for Protection of Literary and Artistic Works provides: "Independently of the author's economic rights, and even after the transfer of the said rights, the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation."

The major arguments in this section are based on the classical justification of patent protection in philosophy and economics, which were identified in the mid-19th century and developed by Fritz Machlup (1958)¹⁰⁰ and other academic writers (e.g. Dutton¹⁰¹, Walterscheid¹⁰², Coulter,¹⁰³ Penrose¹⁰⁴, etc.). There are four theses which are involved in the classical justification. The four theses used to justify the scope of patent are: (1) natural law thesis, (2) the reward – by – monopoly thesis, (3) the monopoly – profit – incentive thesis, and (4) the exchange – for – secrets thesis. These four theses form the basis of modern philosophy and economics concerning the evaluation and justification of the patent system, and they are still utilised today to justify patents on their various grounds. Each thesis forms a different basis and scope in relation to their applicability to patent protection. Although no one thesis can attempt to provide a complete explanation, valuation and justification for the system, yet, taken together these alternative theses are still very useful in the making of current patent policy decisions.

1.5.1 Natural law thesis

The "natural law thesis" is a moral justification (and hence a philosophical justification) based upon the assertion that the inventor has a natural property right in his (or) her ideas. By extension, therefore, he or she also has a natural right to the sole exploitation of their invention and so may exploit it themselves or authorise others to do so for payment. It follows that unauthorised use by others without compensation must be condemned as a form

¹⁰⁰ Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office.

¹⁰¹ Dutton, H. I., 1984. *The Patent System and Inventive Activity During the Industrial Revolution*. Manchester: Manchester University Press.

¹⁰² Walterscheid, E. C., 1994. The Early Evolution of the United States Patent Law: Antecedents (Part 1). *Journal of the Patent and Trademark Office Society*, **77**, pp. 697-715.

¹⁰³ Coulter, M., 1991. *Property in Ideas: the Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press.

¹⁰⁴ Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic History*, **10**(1), pp. 1-29.

of theft. As an item of property, an invention is exclusive and personal, and so society (and thus the State) is under a moral obligation to recognise and protect these rights by law if need be.

The thesis is discussed in Locke's labour theory analysis of property rights, whereby labour functions as a determinant of title.¹⁰⁵ Locke's core propositions have been summarised by Drahos (1996) as follows: (1) God has given the world to people in common; (2) Every person has a property right in his own person; (3) A person's labour belongs to him; (4) Whenever a person mixes his labour with something in the commons he thereby makes it his own property; (5) The right of property is conditional upon a person leaving in the commons enough resources of sufficient good quality to serve the needs of the other commoners; and (6) A person may not take more out of the commons than they can use to their own advantage.¹⁰⁶

At the time that Locke constructed his labour theory, the notion of property was more likely to be directed to the explanation of tangible property, rather than intangible property like inventions. In the 19th century some proponents¹⁰⁷ of the patent system applied Locke's theories to justify the intellectual property protection of the human ideas. Without the creator's mind, his ingenuity, and thus his creations would not exist.¹⁰⁸ Therefore, as a product of a person's intellectual labour, according to Locke's labour theory, the inventor should have a "permanent and inalienable" property right in the product of ideas. Under this theory, Turner (1850) justified the patent system on the basis that it was "simply the application of

¹⁰⁵ See Locke, J., 1690. *Two Treatises of Government*. London: Everyman. For a modern exploration of the philosophy of intellectual property, which includes a discussion of Locke's theories, see also Drahos, P., 1996. *A Philosophy of Intellectual Property*. Aldershot: Dartmouth.

¹⁰⁶ Drahos, P., 1996. *A Philosophy of Intellectual Property*. Aldershot: Dartmouth.

¹⁰⁷ For example: McCulloch, J. R., 1832. *A Dictionary, Practical, Theoretical, and Historical, of Commerce and Commercial Navigation: Illustrated with Maps*. London: Printed for Longman, Brown, Green, and Longmans. See also, Turner, T., 1850. *Counsel to Inventors of Improvements in the Useful Arts*. London: F. Elsworth.

¹⁰⁸ McCulloch, J. R., 1832. *A Dictionary, Practical, Theoretical, and Historical, of Commerce and Commercial Navigation: Illustrated with Maps*. London: Printed for Longman, Brown, Green, and Longmans.

the natural principle of property as the reward of labour"¹⁰⁹. The French patent law of 1791 is also founded on the grounds of the theory. The preamble of the patent law stated: "that every novel idea whose realization or development can become useful to society belongs primarily to him who conceived it, and that it would be a violation of the rights of man in their very essence if an industrial invention were not [to be] regarded as the property of its creator."¹¹⁰

However, the thesis was criticised by the proponents of the Anglo-American law of patents (i.e. British and American patent law). The Westminster Review (1829) stated that: "to talk of natural rights of an inventor is to talk nonsense"¹¹¹. To allege theft of an idea is for a man to complain "that something has been stolen which he still possesses, and he wants that something back which, if given to him a thousand times, would add nothing to his possession."¹¹² "Those who believe the inventor to have a natural right ... must have an entire misconception as to what it is the inventor really achieves."¹¹³

Moreover, if the idea of property is as a form of natural right, then why should it not be recognised in perpetuity rather than only for a temporary term of years? In addition, to be granted patent the invention must also meet other national patentability requirements. So if a patent right were a natural right, no limited monopoly period should be prescribed. Thus the logical basis of the natural - law thesis to justify the existing patent system is not sufficient of itself. Furthermore the natural - law thesis cannot justify why a private right of property should not be granted to independent inventors of the same invention where it occurs to them rather than an exclusive monopoly for that can only be issued to a single applicant who

¹⁰⁹ Turner, T., 1850. *Counsel to Inventors of Improvements in the Useful Arts*. London: F. Elsworth.

¹¹⁰ Preamble to the French Patent Law of 1791.

¹¹¹ The Patent Laws (1829) XXVI Westminster Review, at page 329

¹¹² Rentzsch, H., 1866. cited in Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office, at page 22.

¹¹³ Webster, T., 1841. cited in Dutton, H. I., 1984. *The Patent System and Inventive Activity During the Industrial Revolution*. Manchester: Manchester University Press, at page 18.

happens to be the first to file (or invent) the application.

Therefore, the natural law thesis is rarely supported in modern literature.¹¹⁴ Even in 19th century, while the natural law thesis was generally used in propaganda purposes there were also "the alternative concepts, such as monopoly right or privilege [which] were so unpopular"¹¹⁵. Thus, the reward - by - monopoly thesis, which was native to England during the "Anti-Patent" debate, was proposed as the alternative or main justification for granting patents.

1.5.2 Reward-by-monopoly thesis

To explain the granting of a monopoly for a limited term and also to justify the existence of the patentability requirements, the reward – by – monopoly thesis was provided by Smith, Mill, Bentham etc. who put forth a new thesis to justify the protection of the patent system in the mid 19th century¹¹⁶. The “reward-by-monopoly” thesis, an economic justification, assumes that justice requires that a man should receive an economic reward for his services in proportion to the economic usefulness of his invention to society and that, where needed, society should intervene to secure to an inventor such reward. Inventors render useful services, and the most appropriate way to secure them commensurate rewards is by means of temporary monopolies in the form of exclusive patent rights in their inventions. Since the Middle Ages, systems of privileges, such as Royal Charters and Guild system rights, inventors have been rewarded for their contribution to the community. In the last hundreds

¹¹⁴ Mossoff, A., 2001. Rethinking the Development of Patents: An Intellectual History 1550-1800. *Hastings Law Journal*, 52, pp. 1550-1800

¹¹⁵ Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office, at page 38.

¹¹⁶ See Smith, A., 1904. *An Inquiry into the Nature and Causes of the Wealth of Nations*. 5th ed. London: Methuen & Co.. Mill, J. S., 1909. *Principles of Political Economy*, 7th ed. London: Longmans Green and Co.. Bentham, J., 1932. *A Manual of Political Economy*. [e-book] Available at <http://www.efm.bris.ac.uk/het/bentham/manual_politiceconomy.pdf> [Accessed 10 December 2010].

years, the suitable reward suggested by academics for an invention is a monopoly in the form of a patent. It should be stressed here, that the motivation for the state within the reward – by - monopoly thesis is to secure a community benefit, rather than to give honour or appreciation to the inventor.

In the 18th century, Adam Smith stated that the law and the law maker are important in ensuring that competition is maintained and resources efficiently allocated. The provision of a temporary monopoly was "the easiest and most natural way in which the state can provide recompense ... for hazarding a dangerous and expensive experiment, of which the public is afterwards to reap the benefit"¹¹⁷. Further, "if the legislature should appoint pecuniary rewards for the inventors of new machines, etc., they would hardly ever be so precisely proportioned to the merit of the invention as ... [the patent monopoly] is." Also, the grant of an unjustified monopoly is harmless to society "if the invention be good and as such is profitable to mankind, the inventor will probably make a fortune by it; but if it be of no value he will reap no benefit."¹¹⁸ Thus, a patent is "harmless" since granting it "can do no harm and may do some good"¹¹⁹. Therefore, Smith concluded that a patent grant was "not only a necessary, but also an economically justifiable, means to an end"¹²⁰.

Similar reasoning to justify the patent system was also adopted by John Stuart Mill (1848). He stated "that ... the inventor ought to be both compensated and rewarded ... [it] will not be denied ... It would be a gross immorality in the law to set everybody free to use a person's work without his consent and without giving him an equivalent."¹²¹ He also noted "[even if] pecuniary grants have, in some cases, been made to the inventor, [yet] in general an exclusive

¹¹⁷ Smith, A., 1904. *An Inquiry into the Nature and Causes of the Wealth of Nations*. 5th ed. London: Methuen & Co, at page 108.

¹¹⁸ Ibid. at page 113.

¹¹⁹ Ibid. at page 465

¹²⁰ Ibid. at page 479.

¹²¹ Mill, J. S., 1909. *Principles of Political Economy*. 7th ed. London: Longmans Green and Co. at page 314.

privilege of a temporary duration is preferable, because it leaves nothing to any one's discretion ... [since] the reward conferred by it depends on the invention's being found useful, and the greater the usefulness, the greater the reward, and because it is paid by the very persons to whom the service is rendered, the consumers of the commodity"¹²². Therefore, within the free market economy, a monopoly right is a justified reward and "the present patent [at the time of Mill that is] laws need much improvement"¹²³. Patents have indeed been subsequently more improved and harmonised.

Based on Smith's and Mill's arguments Bentham developed the reward - by - monopoly thesis to justify patents. He firstly divided labour into two distinct subcategories: the first being the bodily energy employed in the production of an effect; and the second, being the skill or mental power displayed in the exercise of the bodily act. Next he stated that "mere labour, exclusive of skill, cannot be copied without equal labour ... skill, on the other hand, ... is ... capable of being indefinitely imbibed and diffused ... without any exertion of mental labour comparable to that ... by which it was [first] acquired ... A man will not be at the expense and trouble of bringing to maturity an invention unless he has had a prospect of an adequate satisfaction."¹²⁴ He then considered the various forms in which this satisfaction may take be it reputation, the possibility that an invention may be reliably kept secret, and the provision of some kind of pecuniary reward. However he concluded that none of these are possible in all situations. Therefore it becomes necessary to provide a temporary monopoly so that "all persons but the author of an invention are excluded for a certain time from the liberty of practising it"¹²⁵. "[A] patent considered as a recompense for the increase given to the stock of wealth by an invention, as a recompense for industry and genius and ingenuity, is

¹²² Ibid.

¹²³ Ibid. at page 332

¹²⁴ Bentham, J., 1932. *A Manual of Political Economy*. [e-book] Available at <<http://www.efm.bris.ac.uk/het/bentham/manualpolitaleconomy.pdf>> [Accessed 10 December 2010], at page 110.

¹²⁵ Ibid, at page 111.

proportionate and essentially just. No other mode of recompense can merit either one or the other epithet."¹²⁶

The reward - by monopoly thesis was almost exclusively used to justify the patent system in the late 1850s but it was questioned in the 20th century. One criticism of the thesis was based on the origin of the invention. "Nearly all useful inventions depend less on any individual than on the progress of society" and that therefore there is no need to "reward him who might be lucky enough to be the first to hit on the thing required."¹²⁷

Another major doubt was on the ground of the kind of reward deserved by inventors. The argument did not deny that an inventor should be rewarded for his or her efforts but questioned whether it was essential to grant a monopoly right as the appropriate reward. Schaffle (1873) reasoned that the advantage gained from the head start that the first user of an invention gains within the market would generally provide a sufficient level of reward for the inventor.¹²⁸ Furthermore, the constant renewal and innovation are inherently required by competition because this is how companies compete against their competitors¹²⁹. Hence, the reward would flow naturally to the first innovator in a market place, without the need for any formal legal intervention.

Furthermore, even if the advantages gained by a head start in the market place are insufficient, it does not mean that the patent system is the most economical method of providing the reward. Macfie (1863) has stated that the open market could not be trusted to secure a

¹²⁶ Ibid, at page 112.

¹²⁷ Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic Histor*, **10**(1), pp. 1-29 at page 18.

¹²⁸ Schaffle (1873) cited in Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office, at page 22.

¹²⁹ Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic Histor*, **10**(1), pp. 1-29 at page 18.

sufficient reward to the inventor to compensate him for his time and effort. However, he still opposed the existence of the patent system because: (1) it hurts free trade; (2) there are too many obvious inventions being patented; (3) under the patent system rewards rarely go to those who deserve them, and the rewards are never in proportion to the invention's contribution to the state of the art; and (4) a great number of patents are based on old ideas or are useless.¹³⁰ He therefore proposed a system of monetary reward by prize or bonus determined according to the social utility of the invention as the best method of providing a reward to the inventor¹³¹. Similarly, Machlup (1950) stated that at that time (i.e. 1860s) many economists supported the abolition of the patent monopoly and suggested instigating a system of direct monetary grants in its place. Machlup says of that time that it was recognised that "what the community requires is, that inventors be rewarded; that skillful men who contribute to the progress of society shall be well paid for their exertions. The patent laws are supported because it is erroneously supposed that they are a means to this end."¹³² Although the argument is rational, yet it is less supportive because the criteria of monetary bonuses for the different kind of inventions are difficult to set forth. Also, the amount of the monetary bonus generally is difficult accurately to equate with the inventor's expectations. Thus, although harms occasionally result from the monopoly right which is granted by patent, it is impossible to prevent this, but a patent still is the most appropriate way to apportion the reward, at least at the current stage.

Thus, the reward – by – monopoly thesis is still an important economic justification for patent protection. However, the thesis has difficulty answering the following questions. First, if the inventor is to be rewarded, what are they actually being rewarded for? What is the rationality

¹³⁰ Macfie, R. A., 1863. *The Patent Question under Free Trade: A Solution of the Difficulties by Abolishing or Shortening the Inventor's Monopoly and Instituting National Recompenses*. 2nd ed. London: W. Johnson.

¹³¹ Macfie, R. A., 1869. *Recent Discussions on the Abolition of Patents for Inventions*. London: Longmans, Green, Reader, & Dyer.

¹³² Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The Journal of Economic History*, **10**(1), pp. 1-29.

for being given a monopoly privilege? If the patentee is rewarded for having a good idea then this moves us to ask why it is only the first to take their invention to the Patent Office that receives the reward? In the face of these questions, a third possible justification for the patent system, the monopoly - profit - incentive thesis, was produced.

1.5.3 Monopoly – profit - incentive thesis

"If the patent system could not be credited with meeting the demands of distributive justice, it was still possible to defend it, not on the ground of justice, but on the ground of its social usefulness"¹³³. The premise of Monopoly-profit-incentive thesis is that the venture, if successful, must be worth the risk. The thesis assumes that industrial progress is desirable, that inventions and their industrial exploitation are necessary for such progress, but that inventions and/or their exploitation will not be obtained in sufficient measure if inventors and capitalists can hope only for such profits as the competitive exploitation of all technical knowledge will permit. To make it worthwhile for inventors and their capitalist backers to make their efforts and risk their money, society must intervene to increase their profit expectations. The simplest, cheapest and most effective way for society to hold out these incentives is to grant temporary monopolies in the form of exclusive patent rights in inventions.

Although this thesis holds that the patent system intended is to secure a community benefit which is the same as that the reward – by – monopoly thesis' statement, yet, justified on different grounds from the reward – by – monopoly thesis. The Monopoly – profit - incentive thesis focuses on a series of assumptions concerning the basic economics of the inventive

¹³³ Ibid.

process instead of on the inventor per se. Lincoln (1859) has indicated that "the patent system [has] added the fuel of interest to the fire of genius"¹³⁴, and Chitty (1824) has said that it was the most effective means of encouraging the "production of Genius"¹³⁵.

The thesis is a product of historical facts. By the end of the Industrial Revolution England had become the first global "superpower" with an Empire covering close to a quarter of the planet's surface. England had a patent system during this time and it was noted that there was a causal relation between the existence of the patent system and the development of English industry. Based on these findings, Price (1913) concluded that the monopoly policy had produced a "system of patents for the effective encouragement of invention"¹³⁶. However, the thesis was also queried because the early development of English industry had occurred before the inception of the patent system. "The more we investigate, the more certain will be our conclusion and belief that we are a great and prosperous people, not in consequence of but in spite of the legal system under which we live."¹³⁷

Indeed, the Monopoly – profit – incentive thesis is based on a number of assumptions. These assumptions were summarized by Machlup & Penrose (1950) as follows: first, that growth and industrial progress is socially desirable; second, that invention is necessary for this progress; third, that the level of invention will be sub-optimal without incentives, and finally that patents are the cheapest and most effective way in which these incentives can be provided¹³⁸.

¹³⁴ Lincoln, 2008, *The Collected Works of Abraham Lincoln, Vol.3*, Maryland, US: Wildside Press, at page 363.

¹³⁵ Chitty, J., 1824. *A Treatise on the Laws of Commerce and Manufactures, and the contracts*. London: Henry Butterworth, at page 6.

¹³⁶ Price, W. H., 1913. *The English Patents of Monopoly*. Cambridge: Harvard University Press, at page 66.

¹³⁷ Coulter, M., 1991. *Property in Ideas: The Patent Question in Mid-Victorian Britain*. Kirksville, U.S.: Thomas Jefferson University Press, at page 41.

¹³⁸ Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic History*, **10**(1), pp. 1-29.

The first two of these assumptions are wholly uncontentious. They are accepted by supporters and opponents of the patent mechanism. The divergence between the two sides focuses on the last two assumptions. The opposition can be grouped into those who disagree with one or both of the last two assumptions.

For the third assumption, which is that the level of invention will be sub-optimal without incentives, the opponents consider that the aim of the establishment of the Elizabethan patent custom was to secure the import of technology¹³⁹ and at that time incentives may well have been necessary. However, when times changed, such incentives became unnecessary because the British had nurtured enough craftsmen to create inventions. Coulter (1991) has stated that: "rather than deny the historical utility of the patent grant altogether, they argued that patents had served their purpose and now could safely be dispensed with"¹⁴⁰. Sir William Armstrong (1863), president of the British Association for the Advancement of Science, said that the "the seeds of invention exist, as it were, in the air, ready to germinate whenever suitable conditions arise, and no legislative interference is needed to ensure their growth in proper season."¹⁴¹ Furthermore, Turner (1850) felt unable to accept that any incentive was required to induce invention. The inventive process was a product of "a taste for experiment, a love of trying" that was characteristic of the English psyche, there was therefore no need for State intervention to promote such activity.¹⁴²

However, the supporters of the patent system challenged the view. Aston (1870) held that "[that] some men could not help inventing might be true, but as rule men invent as they do

¹³⁹ MacLeod, C., 1988. *Inventing the Industrial Revolution: The English Patent system, 1660-1800*. Cambridge: Cambridge University Press.

¹⁴⁰ Coulter, M., 1991. *The Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press, at page 89.

¹⁴¹ Armstrong, W., 1863 cited in Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The Journal of Economic History*, **10**(1), pp. 1-29, at page 22.

¹⁴² Turner, T., 1850. *Counsel to Inventors of Improvements in the Useful Arts*. London: F. Elsworth.

other work, they invent to live or help them live"¹⁴³. Hence, available incentive methods can attract more inventors and increase the number of inventions. The question is whether patents are a better and least harmful method available to incentivise invention. Holden (1871) gave the example of Switzerland, "where there is no patent law whatever of any kind, industry makes no progress, and the people are unemployed."¹⁴⁴ Bentham (1793) indicated that patents "produced infinite effect and costed nothing".¹⁴⁵ But, the view that patents cost nothing was not accepted by the various Royal Commissions and Select Committees appointed in the latter-half of the 19th century. Instead they concluded that the heavy social costs associated with the operation of the patent laws were an unavoidable product of their existence¹⁴⁶.

1.5.4 Exchange – for - secrets thesis

As a contract between the public and the inventor, the exchange – for – secrets thesis holds that a patent represents a bargain between inventor and society, the former surrendering the possession of secret knowledge in exchange for the protection of a temporary exclusivity in its industrial use. If innovators kept their ideas secret, then societal progress would be hampered, since ideas “may die with their inventors and forever be lost to society”¹⁴⁷.

Coulter has stated that "any restrictions that the patent placed upon [the] use of the new

¹⁴³ Aston, W., 1870 cited in Coulter, M., 1991. *Property in Ideas: the Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press, at page 92.

¹⁴⁴ Holden, W., 1871 cited in Coulter, M., 1991. *Property in Ideas: the Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press, at page 155.

¹⁴⁵ Bentham, J., 1793. *A Manual of Political Economy*. [e-book] Available at <<http://www.efm.bris.ac.uk/het/bentham/manualpoliticeconomy.pdf>> [Accessed 10 December 2010].

¹⁴⁶ See, Report of the Royal Commission to Inquire into the Working of the Law Relating to Letters Patent for Inventions 1864. Where it is stated that "the inconveniences now generally complained of as incident to the working of the Patent Laws ... Cannot be wholly removed. They are ... Inherent in the nature of a Patent Law, and must be considered as the price which the public consent to pay for the existence of such a law."

¹⁴⁷ Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office.

manufacture ... were temporary ones acceded to by the public in return for the information contained in the written specification.¹⁴⁸ Hindmarch (1847) pointed the only way in which the patentee could have exclusive property in his invention, once it was made public, was by the application of some positive law made with the actual or implied consent of the whole community. Such consent was deemed to exist because of the benefits accruing to society from the publication of the invention where it might once have remained secret.¹⁴⁹

Some commentators indicated that the "exchange" thesis naturally shares some roots with the incentive thesis, like two sides of the same coin. Granville (1991) stated that "the only principle on which patents could be justified was that the patent was a bargain between the inventor and the public, by which the inventor was encouraged to make inventions, and afterwards encouraged to make them known to the whole world."¹⁵⁰ The opponents disagreed with the incentive process, especially the incentive to disclose, because they argued that while the patentee was perhaps owed something by society for his intellectual expenditure, yet the patentee had already owed society an "intellectual debt". Exemplifying this Stirling (1869) stated that the "inventor has the benefit of all foregone human thought, of all existing civilisation. He has the unbought advantage of all laws, all language, all philosophy. He has the free use of all methods and appliances, spiritual and material, which have been painfully elaborated by the thinkers and workers of all time. Why, then, should he alone have an exclusive privilege in respect of the infinitesimal addition which he makes to the work of ages?"¹⁵¹

¹⁴⁸ Coulter, M., 1991. *Property in Ideas: the Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press, at page 172.

¹⁴⁹ Hindmarch, W. M., 1847. *A treatise on the law relative to patent privileges for the sole use of inventions and the practice of obtaining letters patents for inventions*. London: Harrisburg.

¹⁵⁰ See the speech of Lord Granville in the Lords' Debate of the Patents Bill 1851, Hansard (3rd Series). Vol 118, Cols. 12-17.

¹⁵¹ Macfie, R. A., 1869. *Recent Discussions on the Abolition of Patents for Inventions*. London: Longmans, Green, Reader, & Dyer, at page 58.

However, even if the abolitionists' view of inventions was correct, the patent system could still be supported on the ground that it encouraged the dissemination of knowledge. It did not matter about the "why and wherefores" of the inventive process, the important thing was that without some incentive the inventions that contributed to the technical prowess of the nation, of which all were so proud, would go to the grave with their creators. The patent, it was argued, should not, therefore, be seen as a privilege, but rather as the result of a bargain between the inventor and the State, whereby the inventor agreed to tell the world of his invention in return for a temporary monopoly.¹⁵² Put simply, a "patent is the price of disclosure"¹⁵³.

Critics of the thesis argued that an invention would inevitably leak to the public even if its creator tried to keep it secret. Machlup (1958) has argued that few inventors succeed in keeping their ideas secret for very long and if they do so it would not cost society much since more people usually develop similar ideas within a short period of time.¹⁵⁴ This stresses the difficulty of maintaining secrecy, suggesting that it was so great that, under the social contract theory, protection was given for nothing in return. Indeed, even with patent protection in Britain there was considerable concern, justifiably so, that patented technology would be stolen and sold to foreign industry who did not have to abide by such laws, and who could then undercut British manufacturers¹⁵⁵. However, the supporters of the theory have stated that even if the possibility of maintaining secrecy was confined to special circumstances, the patent system should be defended on this ground.¹⁵⁶

¹⁵² Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic History*, **10**(1), pp. 1-29.

¹⁵³ Dutton, H. I., 1984. *The Patent System and Inventive Activity During the Industrial Revolution*. Manchester: Manchester University Press, at page 22.

¹⁵⁴ Machlup, F., 1958. *An Economic Review of the Patent System*. Washington, US: US Government Printing Office.

¹⁵⁵ Coulter, M., 1991. *Property in Ideas: the Patent Question in Mid-Victorian Britain*. Kirksville, USA: Thomas Jefferson University Press.

¹⁵⁶ Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic History*, **10**(1), pp. 1-29.

1.6 The empirical study of the economic impacts of general patents in the real world

After reviewing the classical justifications of patents, we find that no matter what kind of the thesis is used to explain patents, there is some level of harm which necessarily results from the patent monopoly right. The key point to consider in deciding whether a new category of inventions should be protected by the patent system, is whether the benefits brought by patenting such kinds of inventions justify the granting of a monopoly right. However, the criteria of new protections being "worth" it is still very difficult define. In this dissertation, the author will assume that general patents have completely met the criteria of being "worth" it. We now turn to the specific question whether patenting business method – related inventions are “worth” it. If the benefits and the harms resulting from patenting business method - related inventions overall are the same or similar to the benefits and harms resulting from general patents, it will be reasonable to assume that business method - related inventions will be equally "worth" being protected by patent. Hence, the objective in the following section is to form an overview of the overall economic impact of general patents through surveying the relevant empirical study literature available up to the year 2010, and which literature will provide a basis for justifying whether business method - related inventions should be patented.

1.6.1 Microeconomics perspective

As we discussed in section 1.4 and section 1.5, the fundamental goal of the legal protection of patents consists in creating an incentive. Private producers have an incentive to invest in innovation activities only if they obtain a reasonable return from them. Whether the

producers have adequate incentives depends on their ability to appropriate at least a part of the estimated value of their innovation from users. A growing number of individual inventors and businesses, both SMEs and large companies, are realising the commercial impact of patenting their inventions. In fact, a single inventor is often only able to finance a patent application by obtaining public or corporate sponsorship or by licensing or selling his invention to a larger company¹⁵⁷. In addition, patents give companies the possibility of reaping the rewards of their investment and recouping developments costs. Patents have also become an important tool for measuring a company's R&D performance, as well as a trading and bargaining chip for cross-licensing and making technology alliances. For SMEs, a patent may be able to help firms to attract venture capital and assert their rights in the face of larger companies. Dominic Guellec, a senior economic expert at the OECD (the Organisation for Economic Co-operation and Development), said patents are vital in securing market share for small companies that want to grow independently and avoid simply being gulped [up] by larger firms with more money¹⁵⁸. For large companies, the number of patents, especially high-quality patents, will increase the company's overall value. The stronger a company's patent portfolio, the more it is worth on the stock market, and the higher the price a competitor must pay in the event of a takeover. If potential innovators are limited in their ability to grasp this value, then they may have only insufficient incentive to invest a socially optimal amount of resources in innovation activities, especially when other producers can easily imitate the products. Arrow (1962) has stated that this occurs when private users can easily copy products, or when the legal framework permits innovations which are in a close substitution relationship to the original innovation.

A patent gives the innovator a limited exclusive right, which allows the holder to set a price

¹⁵⁷ European Patent Office, 2010. The Economic Importance of Patents. [online] Available at <<http://www.epo.org/topics/innovation-and-economy/economic-impact.html>> [accessed 15 January 2011]

¹⁵⁸ Guellec, D., & Potterie, B. P., 2007. *The Economics of the European Patent System*. Oxford: Oxford University Press.

for the innovative product which is above the competition price. Thus, the expenditure invested in the innovation and the risk taken by the innovator will be compensated for.¹⁵⁹ Also, the incentives to innovate that patents generate are maximized, and welfare losses caused by the granting of a monopoly are minimized¹⁶⁰. However, it must be considered that the patent system is not necessarily the preferred choice for both product and process innovation. Arundel (2001) analysed data from the 1993 Community Innovation Survey, and indicated that lead-time is clearly the preferred choice for both product and process innovation, while patents rank second-last among the available options¹⁶¹. Also the patent system can result in a negative impact on the profitability of SMEs although large firms which are active in patenting seem to display higher profitability than non-patent active firms. Rogers et al. (2007) found that compared with non-patent active counterparts, the SMEs have lower profitability, and the micro-firms have a negative profitability¹⁶². This is likely to be as a consequence of the risky nature of R&D investment, the smaller product portfolio of smaller firms and the phase of growth of such firms, whose profits are likely to be generated some considerable time after the initial layout of R&D and other start-up or early growth costs. For the same reasons, patent active SMEs are found to be at a higher risk of liquidation or receivership than non-patent active SMEs. In addition, the granting of a patent is a winner-takes all outcome in the business competition for patents and thus trying to exercise control over innovating does not tend to stimulate high levels of investment of resources. The sum of expenditures of two firms that want to win the same patentable invention in a so-called patent race can therefore not only be higher than those for a single firm, but also higher than is

¹⁵⁹ Scherer, F. M., & Ross, D., 1990. *Industrial market Structure and Economic Performance*. 3rd ed. Boston, US: Houghton Mifflin.

¹⁶⁰ Blind, K., Edler, J. & Friedewald, M., 2005. *Software Patents: Economic Impacts and Policy Implications*. Glos: Edward Elgar publishing Limited.

¹⁶¹ Arundel, A., 2001. The Relative Effectiveness of Patents and Secrecy for Appropriation. *Research Policy*, **20**, pp. 611-624.

¹⁶² Rogers, M., Helmers, C. & Greenhalgh, C., 2007. An Analysis of the Characteristics of Small and Medium Enterprises that Use Intellectual Property. [Online] Available at <<http://users.ox.ac.uk/~manc0346/research.html>> [Accessed 18 August 2009].

socially desirable¹⁶³.

In return for granting the monopoly, it is argued that certain regulations over the obtaining of patent rights can also lower the costs for subsequent innovators, in that patent applications force innovators to disclose details of their innovations. Ordover (1991) has stated that this disclosure may supply subsequent innovators with information which can lower their own innovation costs. Furthermore, the author has indicated elsewhere that, if an efficient and friction-free market for licenses is assumed, then it can be presumed that subsequent innovators can efficiently buy these licenses and profit from the precursor's work.¹⁶⁴

From microeconomic perspectives, the last question in the impact of patent is whether the system of patent rights can contribute to a reasonable balance between the production and the diffusion of a patent. The creation of incentives to create new works and inventions leads to resources being spent on innovation activities. If innovations however are not widely used, then the system is possibly less efficient than an alternative one, which admittedly offers less incentive for creative activities, but permits a wider diffusion of new ideas. In this context, the work of Nordhaus (1969) on the length of patent protection and the analyses of trade-off between length and breadth of patent protection should be mentioned (Gilbert and Shapiro 1990; Klemperer 1990). Nordhaus (1969) created an economic model of the inventive process and discussed the relationship between the production and the diffusion of patents¹⁶⁵. According to this model, Gilbert and Shapiro (1990) concluded that "if one interprets patent policy broadly enough to include at least one policy instrument that affects the flow of profits from the sale of the patented product, then optimal policy calls for infinitely long-lived

¹⁶³ Dasgupta, P., & Stiglitz, J., 1980. Industrial Structure and the Nature of Innovative Activity. *The Economic Journal*. **90**, pp. 266-293.

¹⁶⁴ Ordover, J. A., 1991. A Patent System for Both Diffusion and Exclusion. *The Journal of Economic Perspectives: A Journal of the American Economic Association*, **5**(1), pp 43-60.

¹⁶⁵ Nordhaus, W. D., 1969. An Economic Theory of Technological Change. [Online] Available at <<http://cowles.econ.yale.edu/P/cp/p02b/p0297.pdf>> [Accessed 3 October 2008].

patents whenever patent breadth is increasingly costly in terms of deadweight loss¹⁶⁶. Klemperer (1990) demonstrated that broad, short-lived patents can be optimal if wider patents discourage substitution away from the patented product by making noninfringing alternatives less attractive to buyers.¹⁶⁷

Overall, in the microeconomic perspective, the patent system provide economic incentives to innovate by protecting the returns to R&D, and that these attract capital, defend competitive advantage or signal value and avoid the problem of being eaten up by larger firms with more money. However, the patent system also generates some negative impacts on the incentives for investment, especially in the case of SMEs, because of lower periodic profitability and the consequences of the patent race. On the other hand firms can use others' patents as a source of information for their own innovative activities, which reduces their own innovation costs and diffuses patent technologies.

1.6.2 Macroeconomic perspective

From the Macro-economic perspective, the impact of patents can be divided into two dimensions. The first one is that patents will affect the regional economy as a whole. The second one is that the differences in regional patent protection regimes will influence trade flows and foreign direct investments.

1.6.2.1 Impact on regional economy as a whole

¹⁶⁶ Gilbert, R., & Shapiro, C., 1990. Optimal Patent Length and Breadth. *The RAND Journal of Economic*, **21**, pp. 106-112.

¹⁶⁷ Klemperer, P., 1990. How Broad Should the Scope of Patent Protection Be?. *The RAND Journal of Economics*, **21**, pp. 113-130.

When the regional economy (the economy of the jurisdiction which the particular patent laws govern) is considered as a whole, one must refer to the endogenous growth theory, which is created by Romer (1990) and developed by Grossman & Helpman (1991) and Aghion & Howitt (1992, 1998) etc. The theory explicitly model the production of knowledge, or R & D. Regarding intellectual property rights, Romer (1990) has stated that stronger protective rights create stronger incentives to create more innovations, which again broadens the knowledge bases of the whole economy and thus increases economic growth¹⁶⁸. However, Jaffe (1999) and Thumm (2000) criticise Romer. They held that competitive enterprises were able to use the rights to block innovation activities, which might lead to a serious impairment of the innovation dynamics for the sector as a whole.¹⁶⁹

However, Jaffe and Thumm's findings are not supported by empirical studies. Gould and Gruben (1996) have utilized cross-country data on patent protection, trade regime, and country-specific characteristics to examine the role of intellectual property rights in economic growth and they conclude that intellectual property rights, especially in open economies, positively influence economic growth¹⁷⁰. Thompson and Rushing (1999) also find a positive connection between patent protection and prosperous economies¹⁷¹.

In the meantime, the limitation of these empirical studies was noted. These empirical studies only use R&D expenditure as input indicators and intellectual property rights as output indicators in assessing economic growth¹⁷². In fact, in the real world there are many factors

¹⁶⁸ Romer, P., 1990. Endogenous Technological Change. *Journal of Political Economy*, **98**, pp. 71-102.

¹⁶⁹ Jaffe, A. B., 1999. The US Patent System in Transition: Policy Innovation and the Innovation Process. *Research Policy*, **29**, pp. 531-557. Thumm, N., 2000. Neubeurteilung von Patenten als Schutzmittel. IPTS Report, Sevilla, Spain: IPTS.

¹⁷⁰ Fould, D. M., & Gruben, W. C., 1996. The Role of Intellectual Property Rights in Economic Growth. *Journal of Development Economics*, **48**, pp. 323-350.

¹⁷¹ Thompson, M. A., & Rushing F. W., 1999. An empirical analysis of the impact of patent protection on economic growth: an extension. *Journal of Economic Development*, **24**(1), pp. 67-76.

¹⁷² Keely, L. C., & Quah, D., 1998. Technology in Growth. Working paper In: Centre for Economic Policy Research, London.

which influence the economic growth. Jungmittag et al. (1999) have compared freely accessible knowledge for economic growth and proprietary knowledge in Germany, and they found that in Germany the stock of technical standards and rules has had a greater influence on economic growth than the patent stock¹⁷³. However, in 2005 Blind and Jungmittag applied a pooling approach covering four countries, the UK, France, Germany and Italy, and twelve manufacturing sectors. The result of this contrasts with the research for Germany (conducted by Jungmittag in 1999): In the four country study the contribution of the patent stock to growth is significantly higher.¹⁷⁴ A similar conclusion also was made by a joint research project of the WIPO Japan Office and the United Nations University (UNU)¹⁷⁵. The research measured the impact of IP systems in six Asian countries (China, India, Japan, Malaysia, the Republic of Korea and Vietnam) through analysing empirical data dating back over the last 20 to 30 years before and after IP-related reforms were enacted and they concluded that there existed “a positive correlation between the strengthening of the IP system and subsequent economic growth.”

From the literature survey, we can conclude that, no matter whether or not intellectual property rights are the main factor which sustains the growth of the whole regional economy, their influence in stimulating the growth of regional economy is without doubt.

1.6.2.2 Economic impacts of patent in an open economy

Part 1.6.2.1 discussed the macro-economic impact in a closed economy. In this part, we will discuss the macro-economic impact in an open economy. Since at present countries are being

¹⁷³ Jungmittag, A., Blind, K. & Grupp, H., 1999. Innovation, Standardisation and the Long-term Production Function. A cointegration analysis for Germany 1960-96. *Journal of Applied Social Science Studies*.**119**, pp. 205 -222

¹⁷⁴ Blind, K., & Jungmittag, A., 2005. The Impact of Standards on Macroeconomic Growth: A panel Approach Covering Four Countries and 12 Sectors. *Journal of Productivity Analysis*. **29**(1), pp. 51-60.

¹⁷⁵ Yasuda, F., & Kato, H., 2007. Impact of the Intellectual Property System on Economic Growth. Available at <http://www.wipo.int/export/sites/www/about-ip/en/studies/pdf/wipo_unu_07_general.pdf> [Accessed 3 March 2010].

linked by trade and investment, an assessment of the macro-economic impact in an open economy will have to consider these two factors (i.e., trade and investment).

Since 1990s the link between patent protection and trade flows has attracted attention. Helpman (1993)¹⁷⁶ finds that strong foreign patent protection expands markets by increasing the fraction of goods not imitated. Such protections also increase the market share of products with monopoly power produced by firms based in developed countries. Maskus and Penubarti (1995)¹⁷⁷ produced an empirical model in which deviations of bilateral sectoral imports from anticipated levels are related to income, trade barriers, and patent laws and they find strong evidence of market expansion effects of patent rights on the distribution of these countries' exports across large and small developing economies. Smith (1999)¹⁷⁸ has estimated that bilateral trade equations that account for trade distortions are related to patent rights. The data that he used concerns state-to-country manufacturing exports in 1992. His conclusions show that stronger patent protections¹⁷⁹ increase U.S. exports to markets in countries with strong imitative abilities. Strengthening patent rights in countries that pose a weak threat-of-imitation reinforces monopoly power and reduces U.S. exports to these markets.

Some studies also examined the link between patent protection and Foreign Direct Investment (FDI). Dunning (1994)¹⁸⁰ emphasized the need for governments to pay special attention to their regulatory environments in an era of globalization, because different levels

¹⁷⁶ Helpman, E., 1993. Innovation, Imitation and Intellectual Property Rights. *Econometrica*, **61**, pp.1247-1280.

¹⁷⁷ Maskus, K., & Penubarti, M., 1995. How Trade-Related Are Intellectual Property Rights. *Journal of International Economics*, **39**, pp. 227-248.

¹⁷⁸ Smith, P., 1999. Are Weak Patent Rights A Barrier to U.S. Exports? *Journal of International Economics*, **48**, pp. 151-177.

¹⁷⁹ In this article Smith (1999) stated that "Over the past decade, numerous initiatives sought to strengthen and harmonize these means [patents, copyrights, trademarks, and trade secrets] for protecting intellectual property rights (IPR). Many of the initiatives were formulated within the context of bilateral or multilateral trade policy.... Each of these initiatives used trade policy as a principal vehicle for strengthening IPRs". See Ibid. at page 151.

¹⁸⁰ Dunning, J. H., 1994. *Globalization, technical change and the spatial organization of economic activity*. In: Bertil Ohlin Symposium, Stockholm, Sweden.

of protection for intellectual property across countries may influence where a multinational firm decides to locate. Anand and Kogut (1997)¹⁸¹ stated that in a corporate strategy, location decisions have to be based on the ability of host countries to provide the complementary skills, infrastructure, supplies, and institutions to operate technologies efficiently. It will also be based on the country's regulatory regime on Intellectual property rights. Mansfield (1994)¹⁸² stated that firms are more likely to invest in countries with strong intellectual property rights protection, since a smaller risk of imitation leads to a relatively larger net demand for protected products. Adequate protection and enforcement of patent and other intellectual property rights is considered important in order to assure foreign investors that their technologies will not leak out to competitors¹⁸³.

Some empirical studies have identified a positive relationship between patent protection and FDI. Lee and Mansfield (1996)¹⁸⁴ found that a country's system of intellectual property protection influences the volume and composition of U.S. foreign direct investment based on data obtained from almost 100 U.S. firms regarding their perceptions of how weak or strong intellectual property protections exist in various countries. Their conclusion is confirmed by Maskus (1998)¹⁸⁵. In Maskus's study, exporting to countries with strict patent protections was more highly developed. Direct investment is also lower in the countries with weakly developed property rights.

¹⁸¹ Anand, J., & Kogut, B., 1997. Technological Capabilities of Countries, Firm Rivalry and Direct Investment. *Journal of International Business Studies*, **28**(3), pp. 47-55.

¹⁸² Mansfield, E., 1994. *Intellectual Property Protection, Foreign Direct Investment and Technology Transfer*. Washington, U.S: The World Bank.

¹⁸³ Sherwood, R. M., 1990. *Intellectual Property and Economic Development*. Boulder, U.S. Westview Press. See also Gadabaw, R., & Richards, T., 1988. *Intellectual Property Rights: Global Consensus Global Conflict*. London: Westview Press.

¹⁸⁴ Lee, J., & Mansfield, E., 1996. Intellectual Property Protection and U.S. Foreign Direct Investment. *The Review of Economics and Statistics*, **78**(2), pp.181-186.

¹⁸⁵ Maskus, K. E., 1998. The International Regulation of Intellectual Property. [Online] Available at <<http://siteresources.worldbank.org/INTRANETTRADE/Resources/maskus3.pdf>> [Accessed 5 February 2010].

Lai and Qiu (2003)¹⁸⁶ and Grossman and Lai (2004)¹⁸⁷ used the Romer model in an open economy version and found that (1) developed countries would choose higher level of IPR protection than developing countries due to their asymmetry in innovative capability; (2) imposing the developed countries' level of IPR protection on developing countries (as required by TRIPS) would lead to a welfare gain (loss) in the developed countries (developing countries). Based on these studies, Chu and Peng (2009)¹⁸⁸ extend the analysis by considering the effects of IPR protection on income inequality across countries. They find that stronger patent rights in one country would lead to an increase in economic growth and income inequality in both domestic and foreign countries.

However, not all empirical analyses confirmed a positive relationship between patent protection and FDI. Seyoum (1996)¹⁸⁹ found a nonsignificant relationship between the patent protection and FDI when he used empirical findings based on a study of 27 countries, and this was confirmed by Yasuda and Kato (2007).¹⁹⁰ In these studies, the results showed a significant relationship for developed countries. However, there is no significant relationship for less developed countries. However, the conclusion was overturned by Seyoum himself in his repeat study of 2006. In the repeat study, Seyoum selected a sample of 70 countries randomly from different geographical areas and used the ordinary least squares (OLS) regression model¹⁹¹ to analyse the effects of patent protection on FDI. The request study

¹⁸⁶ Lai, E., & Qiu, L., 2003. The North's Intellectual Property Rights Standard for the South? *Journal of International Economics*, **59**, pp. 183-209.

¹⁸⁷ Grossman, G., & Lai, E., 2004. International Protection of Intellectual Property. *American Economic Review*, **94**, pp. 1635-1653.

¹⁸⁸ Chu, A., & Peng, S. K., 2009. International Intellectual Property Rights: Effects on Growth, Welfare and Income Inequality. In: Institute of Economics, Academia Sinica Working Paper No. 09-A006.

¹⁸⁹ Seyoum, B., 1996. The Impact of Intellectual Property Rights on Foreign Direct Investment. *Columbia Journal of World Business*, **31**(1), pp. 51-59.

¹⁹⁰ Yasuda, F., & Kato, H., 2007. Impact of the Intellectual Property System on Economic Growth. [Online] Available at <http://www.wipo.int/export/sites/www/about-ip/en/studies/pdf/wipo_unu_07_general.pdf> [Accessed 3 March 2010]. In this study, Yasuda and Kato empirically analysed the effects of IP on foreign direct investments (FDI) in four Asian countries: Korea, Vietnam, India and Malaysia. The results show only one positive result is reported (Malaysia). The data from the other three countries (Korea, Vietnam, India) do not show positive or negative results between Intellectual Property Protection and FDI.

¹⁹¹ Ordinary least squares regression model is a generalized linear modelling technique that may be used to model a single

indicated that patent protections have a positive influence on FDI and support the fact that the level of patent protections is a strong determinant of investment flows¹⁹².

The literature survey shows that in an easily imitative technological field, on the one hand the enhancement of patent protection in a country will result in the growth of imports into the country, on the other hand, it will also result in an increase in FDI into the country. At least this conclusion is true for developed countries.

1.6.3 Summary

The empirical evidence shows that in the real world, patent mechanism is playing a more and more important role in the micro-economies field and macro-economies field. The contribution of the patent mechanism are addressed in protecting the returns of R & D, increasing the diffusion of knowledge to reduce subsequent innovators' innovation costs, attracting investment, defending competitive advantage, and furthermore improving national/regional economic growth. This is helpful for the research in collecting data and quantitatively or semi-quantitatively analysing the economic effect of allowing/disallowing business method patents.

1.7 The changing business method environment and the challenges

Before discussing the arguments regarding patentability of business method, it is necessary to

response variable which has been recorded on at least an interval scale. The technique may be applied to single or multiple explanatory variables and also categorical explanatory variables that have been appropriately coded. See Moutinho, L. and Hutcheson, G. D. (eds), 2011. *The Sage Dictionary of Quantitative Management Research*. London: SAGE Publications Ltd. at page 224.

¹⁹² Seyoum, B., 2006. Patent Protection and Foreign Direct Investment. *Thunderbird International Business Review*, **48**(3), pp. 389-404.

understand the background of business method patents: why and how the issue is raised, which will be helpful to realise the characteristics of business method – related inventions.

Traditionally, business methods were conducted in a purely manual way. However, the situation changed following recent developments in technology. Since the middle of the 20th century, the most dramatic development in the technology field has been the advent of computing and information communication technologies. Computer programs are composed of electronic information and so accordingly easily facilitate product reproduction or mass production. Also the appearance of computer networks enable information to be shared and communicated throughout the organisations or between an organisation and specific / unspecific individual(s). These developments are changing ways of doing business. For example, in the organizational management structure, Lawless (2000) has stated that the development of Information Technology has resulted in middle management being reduced and workers being empowered to resolve a range of business issues themselves¹⁹³.

The development of computer networks, especially the introducing of the World Wide Web (www), further provides potential connections to millions of people and information sources worldwide. Traditional sale and purchase transactions are completed in a store or other physical market places. Following the development of information technology, modern buying and selling of products or services can be completed globally over electronic systems such as Internet and other computer networks. Such computer communication enabled trade is called electronic commerce. A representative type of electronic commerce conducted by companies is that of Amazon.com. Amazon.com, Inc. is a US-based multinational electronic commerce company, founded in 1994. Its web - site went online in 1995. Amazon started as

¹⁹³ Lawless, G. W., 2000. Information Technology (IT) For Manufacturing: Where Has It Been, Where Is It Heading?. *Journal of Industrial Technology*. **16**(4), pp.1-4.

an online bookstore, but soon diversified, selling DVDs, CDs, MP3 downloads, games, furniture, food, and toys etc. In the fiscal year of 2010, the net income of Amazon.com, Inc. achieved 1,152 million dollars¹⁹⁴. Many traditional stores, such as Tesco, Asda, Harvey Nichols, Pizza Hut, etc., have launched online sales services. Besides new ways of selling, the development of information technology has also changed ways of marketing and advertising¹⁹⁵, ways of product delivery¹⁹⁶, ways of recruiting¹⁹⁷, methods of accounting¹⁹⁸, and so on.

More significantly matter-based economies are switching to knowledge-based economies, based heavily on the information and knowledge goods¹⁹⁹. In a knowledge-based economy, the importance of knowledge is being paid more and more attention by people as a tool for producing economic benefits. The knowledge itself may become a transferrable good. People start to focus on the production and management of knowledge. Business methods essentially belong to categories of knowledge, which means that business methods seem to be drawn out of the public domain and into the class of potential goods in a knowledge-based economy. Furthermore, even if business methods are not respected as a saleable product, they are still helpful as a means whereby an entrepreneur can gain competitive advantage²⁰⁰ through leveraging these innovations and thus playing an important role in the new knowledge based economy. Business methods are intangible, non-excludable and non-rivalrous²⁰¹. Copies may

¹⁹⁴ Amazon.com, Inc., 2010. Annual Report 2009-2010. [Online] Available at: < <http://phx.corporate-ir.net/phoenix.zhtml?c=97664&p=irol-reportsannual>> [Accessed 12 November 2010]

¹⁹⁵ For example, Google AdWords, which can advertise to people searching on Google and its advertising network.

¹⁹⁶ For example, Microsoft, Inc. can immediately deliver its software product online.

¹⁹⁷ For example, in the website, <http://www.jobsite.co.uk/>, the job seekers can upload their CV and let recruiters find appropriate staff.

¹⁹⁸ For example, a method of avoiding taxes by using a credit card to borrow money (US Patent No. 5,206,803)

¹⁹⁹ Cornes, R., & Sandler, T., 1986. *The Theory of Externalities, Public Goods and Club Goods*. Cambridge: Cambridge University Press.

²⁰⁰ For example, a proper tax saving methods can help business organisation to gain a greater tax refund benefits and reduce its cost. A valid management method will help business organisation to cut redundant employees and save the cost. An effective and efficient method to obtain early customer feedback will contribute to the producer in improving the product quality.

²⁰¹ In economics, “non-excludable” means that a good cannot be withheld from any individual, even if they refuse to pay for it. “Non-rivalrous” means that a good supplied to one person is automatically supplied to others at no extra cost. Additional

be produced at very low cost, even zero-marginal cost, and therefore can be distributed to the market and shared among vast numbers of users at very low cost. Cheap reproduction results in business method innovators facing difficulties in controlling the distribution and use of their innovations. This may cause them harm and reduce the effectiveness of their competitive advantages. Thus it becomes important to ask, how to protect business methods and stimulate the development of business method innovations. This is a major problem that contemporary businessmen and other stakeholders are facing. In the legal field, as there exist well-known methods to guard technological advances and creative arts, intellectual property rights seem to be the most appropriate choices for protecting business method innovators against the imitation of their strategies by competitors.

Traditionally, the most primary approach to protect business methods is the trade secret law in the Intellectual property legal field. The basic purpose of trade secret protection is to guard against unauthorized appropriation of the confidential information. A trade secret is a formula, practice, process, design, instrument, pattern, or compilation of information used by a business to obtain an advantage over competitors or customers. Under the European Union Commission Regulation, trade secrets are generally referred to as “know-how” which is defined as a “body of technical information that is secret, substantial, and identified in any appropriate form”²⁰². Secret means “not generally known or easily accessible”²⁰³. The

consumption of the good does not add anything to the costs of production. See Scott, J. & Marshall, G. (Eds), 1998. *A Dictionary of Sociology*. 2nd ed. Oxford: Oxford University Press.

²⁰² Article 10 of Commission Regulation (EU) No 240/96, which provides: “For purposes of this Regulation: (1) ‘know-how’ means a body of technical information that is secret, substantial and identified in any appropriate form; (2) ‘secret’ means that the know-how package as a body or in the precise configuration and assembly of its components is not generally known or easily accessible, so that part of its value consists in the lead which the licensee gains when it is communicated to him; it is not limited to the narrow sense that each individual component of the know-how should be totally unknown or unobtainable outside the licensor’s business; (3) ‘substantial’ means that the know-how includes information which must be useful, i.e. can reasonably be expected at the date of conclusion of the agreement to be capable of improving the competitive position of the licensee, for example by helping him to enter a new market or giving him an advantage in competition with other manufacturers or providers of services who do not have access to the licensed secret know-how or other comparable secret know-how; (4) ‘identified’ means that the know-how is described or recorded in such a manner as to make it possible to verify that it satisfies the criteria of secrecy and substantiality and to ensure that the licensee is not unduly restricted in his exploitation of his own technology, to be identified the know-how can either be set out in the license agreement or in a separate document or recorded in any other appropriate form at the latest when the know-how is transferred or shortly

requirement that the trade secret be "identified in any appropriate form" essentially means that evidence of the trade secret's existence must be fixed in a tangible medium (*e.g.*, datable paper documents, electronic media, etc.) before it can be legally recognized and action taken against those who would acquire it and use it unlawfully (*e.g.* in the UK in terms of the common law of breach of confidence. Entrepreneurs rely on trade secrets to prevent competitors from gaining access to any confidential business information because possession of such information may confer a competitive advantage to the holder. The main advantage of trade secret protection is that it has an indefinite protection term. Also it does not involve complex and expensive filing or application requirements. Entrepreneurs rely on trade secrets to prevent competitors from gaining access to any confidential business information because possession of such information may confer a competitive advantage to the holder. As long as invention remains secret, the protection does not expire and can last forever. There are some well known examples of knowledge protected in this way. For example, the Coca Cola recipe has been kept secret for a very long time and has provided the owners with continuing brand value and revenue since its launch in the US in the late 19th century.

However, trade secrets do not provide sufficient protection for business method innovators. Under the trade secret law, even with the protection of a non-disclosure agreement, an ex-employee can unlawfully disclose the invention²⁰⁴ which may thereby become generally known and enter common usage. Once the secret enters the public domain it is no longer protectable. Also, competitors can learn about the invention using reverse engineering or because business methods are easily identified. Thus, entrepreneurs attempt find alternative methods to protect their business method innovations. It is hoped that such alternatives will

thereafter, provided that the separate document or other record can be made available if the need arises;..."

²⁰³ Ibid.

²⁰⁴ Merges, R. P., Menell, P. S. & Lemley, M. A., 1997. *Intellectual Property in the New Technological Age*. New York, US: Aspen Law & business.

avoid the deficiencies of trade secret protection. Within this context, patent protection of business methods is a viable alternative as a patent owner has the exclusive right to stop others from exploiting (e.g. making, importing, using or selling) the patented method commercially without its consent for a limited time (even if the method was developed independently). Thus, if a business method is patentable, through patenting, the patent holder can prevent competitors from copying the method without permission and exploiting it. Patents also entitle the patent holder to sue infringers for damages and to obtain injunctions to stop them from continuing to do infringing acts.

Although patenting business method innovations is a high priority for many holders of business methods, whether patent protection for such innovations is possible in law is another matter. "The emergence [of possible patent protections for business methods] in [the IT industry] offered both enormous new opportunities and substantial challenges to the current model of intellectual property."²⁰⁵ It created new problems when the old model patent system was applied to meet the demands of new technology with the development of IT industry in knowledge-based economy era. The conflict of new technology and the "stable" patent law systems has produced many discussions in academia concerning the patentable subject matter.

In practice, it seems the scope of patentable subject matter is being broadened. Before the end of last century, business method had been thought of as unpatentable subject matters. However, the situation changed with the landmark decision of the US Court of Appeals for the Federal Circuit (CAFC), State Street Bank Co. & Trust v. Signature Financial Group, Inc. (1998)²⁰⁶. In 1998, the CAFC held that in general business methods are indeed eligible for patent protection, which opened a door for patent protection for business methods in the USA.

²⁰⁵ National Research Council, 2000. *The Digital Dilemma, Intellectual Property in the Information Age*. Washington, U.S.: National Academy Press, at page 25.

²⁰⁶ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998)

In response, a series of interpretative changes occurred in US court decisions and in the United States Patent and Trademark Office (hereinafter USPTO) practices and procedures. Business methods have been classified under the US patent Classification. A flood of patent applications, which were intended to protect the methods of conducting businesses, have been granted to software developers²⁰⁷, on-line merchandisers²⁰⁸, financial services firms²⁰⁹, traditional hardware manufacturers²¹⁰, and even agricultural companies²¹¹ etc. The total application filings in the patent classes covering business methods in the US rose from 974 in 1997 to 3,020 in 1999, and to 11,378 in 2007.²¹² However in Europe, although many companies have sought to secure de facto control of business methods²¹³, the EPO seems to be reluctant to grant patents to business method inventions²¹⁴.

1.8 The academic controversy of business method patent

The development of computer and information technology enables business methods to be conducted using the software platforms. At the same time as the battle for patentability of software was waged and won, the patentability of business methods with software platforms came into view. Later, the argument for patentability, originating from the rationality of

²⁰⁷ For example: U.S. Patent No. 6,070,150, entitled "Electronic Bill Presentment and Payment System", assigned to Microsoft.

²⁰⁸ For example: U.S. Patent No. 6,058,417, entitled "Information presentation and management in an online trading environment", assigned to eBay.

²⁰⁹ For example: U.S. Patent No. 6,061,663, entitled "indexRebalancing", assigned to Nasdaq

²¹⁰ For example: U.S. Patent No. 6,081,793, entitled "Method and System for Secure Computer moderated Voting", assigned to IBM.

²¹¹ For example: U.S. Patent No. 5,897,619, entitled "Farm Management System", assigned to Agriperil Software.

²¹² Hunt, R. M., 2008. Business Method Patent and U.S. Financial Services. [online] Available at: <<http://www.philadelphiafed.org/research-and-data/publications/working-papers/2008/wp08-10.pdf>> [Accessed 23 March 2009].

²¹³ Some business method-related inventions have been granted de facto by European Patent office, for example, General-purpose management system, method for operating said system and transfer slip (European Patent No. EP 209. 907); Distributed system and method for matching of buyers and sellers (EP 407 026); Method and apparatus for handling newspapers and magazines (European Patent No. EP 964 825); A method of holding an auction and uses of the method (European Patent No. EP 1012 764) etc.

²¹⁴ In April 2007, the EPO's president Alasin Poupidon, in his letter to Jacob LJ (Re: Court of Appeal Judgement [2006] EWCA Civ 1371), stated "at the moment there is an insufficient legal basis for a referral" and refused to provide clarification on the EPO's position on the exclusions to patentability set out in Article 52 (2) EPC. [online] Available at: <<http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-pn/p-pn-subjectmatter/p-pn-subjectmatter-letter.htm>> [Accessed 18 November 2009].

computer-implemented business method patents, evolved into whether patent protection should also be granted to business method inventions implemented on other apparatus, or even the patentability of business methods *per se*. Although the number of business method patents granted has exploded in US since the State Street Bank Decision (1998) opened the flood gates to the patentability of business methods implemented on computers, the issue of patentability of business methods generally has still been continuing to be discussed in academia. To clarify the research questions of this study, it is obviously necessary to review these academic controversies.

1.8.1 Debates surrounding patent-eligible subject matter

The earlier debate over business method patentability focuses on what is the appropriate subject matter for patent protection. The laws or patent practices of many countries suggest that certain subject matters are or are not something for which patents should be granted²¹⁵. This is partly a logical and partly a practical issue.

In the US, it has been long held by the US Supreme Court that abstract ideas are not eligible for patent protection. A subject matter, which "merely constitute abstract ideas rather than describing technical means", should not be protected by the patent system.²¹⁶ Business method patents had crossed a crucial boundary between "a substantial, tangible, nuts-and-bolts world... into the realm of thought and abstraction."²¹⁷ If such patents were to be allowed, then "the frontiers of the patent system [would] appear virtually without limit"²¹⁸.

²¹⁵ For example: EPO: Article 52(2) EPC. US: Section 101 of Title 35 U.S.C. For the full text of the articles see Appendix 1 and Appendix 2.

²¹⁶ PĚTNYČYTĚ, E., 2004. Should Patent Protection Be Extended To Business Methods? *International Journal of Baltic Law*, **1**(3), pp. 114 -135.

²¹⁷ Gleick, J., 2000, Patently Absurd. *N.Y. TIMES*, 12 Mar. at page 44.

²¹⁸ Thomas, J. R., 1999. The Patenting of the Liberal Professions. *Boston College Law Review*, **40**(5), pp.1139-1185 at page

Thomas (1999) stated that the reform of the patent system was entering into an erroneous zone. "The patent system now seems poised to impact callings ranging from the arts, to the social sciences, to the law itself"²¹⁹. He believes that "patent law should comport with our perception of what technology is, not defy it. ...[Distinguishing technology and anything artificial] would enable us to maintain the integrity of our current patent system ... and ... respect the boundary between the whole expression of our humanity and that small part of it that is properly called technological."²²⁰ Based upon the consideration of "technology", Durham (1999) conducted an exhaustive search for a definition of "technology" and concluded that even if the art of computer programming is within the definition and should be treated as patent-eligible subject matter, a soft-embodied business method is not and should not be patent-eligible, because the technology protected by patent laws is intended to cover material goods²²¹. Business methods have nothing to do with technology. The patent system is now going beyond technological innovation to protect social innovation²²². However, at the same time, the new technological developments seem to create ever increasing quantities of potential subject matter for Intellectual Property. Most of the pre-existing doctrines and principles, which were devised to explain mechanical and hardware technologies, are not applicable to the new technologies, such as software engineering or digital computing.²²³ Technological changes require new principles or new doctrines to be developed to accommodate new patentable subject matters, and these principles and doctrines will produce "the addition of new types of knowledge and technology as a patent eligible subject

1185.

²¹⁹ Ibid.

²²⁰ Ibid. at page 1186.

²²¹ Durham, A. L., 1999. "Useful Arts" in the Information Age. *Brigham Young University Law Review*, pp.1419-1528.

²²² Sommer, J. H., 2000. Against Cyberlaw, *Berkeley Technology Law Journal*, **15**, pp. 1158-1160.

²²³ Merges, R. P., 2000. One Hundred Years of Solicitude: Intellectual Property Law, 1900-2000. *California Law Review*, **88** (6), pp. 2187-2240.

matter"²²⁴. "One such subject matter includes the methods of doing business, especially in the context of computerised networks or as a method of doing e-commerce"²²⁵.

In Europe, Article 52(2) of the EPC explicitly excludes business methods from patentability. However, the exclusion in the provision is only "to the extent to which a European patent application or a European patent relates to such subject-matter or activities **"as such"**"²²⁶. According to the paragraph and the statement of Hart et al. (2000), Wagner interpreted this to mean that "the legislator did not want to exclude all business methods from patentability by combining the two provisions of Art. 52 (2) and (3) EPC and decided that patentability is allowed for - at least - some business methods"²²⁷. However, there is no clear definition of what is meant by a "business method as such", which leaves it open to interpretation. Having reviewed the legal history Gall (1997), Director of Legal Affairs at the European Patent Office, reaches the following conclusion:" the reason for the exclusion ... as such ... is that, like discoveries, scientific theories, mathematical methods and presentations of information, they are not of a technical nature. Patentability requires a specific technical application".²²⁸

1.8.2 Debates surrounding patent quality

²²⁴ Lee, N., 2003. Patent Eligible Subject Matter Reconfiguration and the Emergence of Proprietary Norms - The Patent Eligibility of Business Methods. [Online] Available at < <http://vanha.law.utu.fi/innovation/eligibility.pdf>> [Accessed 10 october 2009].

²²⁵ Ibid.

²²⁶ Art. 52 (3) EPC. For the full text of this article see Appendix 2.

²²⁷ Wagner, S., 2006. Business Method Patents in Europe and Their Strategic Use: Evidence from Franking Device Manufacturers. SFB Discussion Paper No. 386. See also, Hart, R., Holmes, P. & Reid, J., 2000. The Economic Impact of Patentability of Computer Programs, Report to the European Commission, OECD. In the paper, Hart et al. stated: "the Board considered that the combination of the two provisions of Article 52 (2) and (3) demonstrated that the legislators did not want to exclude from patentability all programs for computers. The fact that only patent applications relating to programs for computers as such are excluded from patentability means, in the Board's view, that patentability may be allowed for some programs for computers."

²²⁸ Gall, 1997 cited in Hart, R., 1997. The Case for Patent Protection for Computer Program-Related Inventions. *Computer Law & Security Report*, **13**(4), pp. 247-252, at page 247.

Aside from the patent-eligible subject matter, the second type of debate concerns the question of patent quality, and the ability of patent offices to deal with business method patent applications.

A patent represents a bargain with society. In return for a temporary monopoly to exploit the invention, the inventor must disclose the invention's technical specifications to the public instead of keeping them secret²²⁹. To justify such a grant, the inventor must introduce the invention and show that it has a value. The patentable invention must contribute both novelty and inventive step (EPO) (or nonobviousness (US)). The referencing of prior patents and other published resources (nonpatent references), which consists of evidence of what has been done before in a given field of technology, and a description of related technological advances in the field, are considered key in establishing whether the invention is novel and nonobvious or involves an inventive step. If there is very little prior art with which the patent claims can be compared, it becomes difficult to prove the invention's novelty and obviousness or that it involves an inventive step. At present, in most systems of patent law, the patent office, the institution in charge of granting patents, holds a prior art database, which constitutes the sum of the information that has been made available to the public in any form before a given date that might be relevant to a patent's claims of originality (these include national and foreign patents, prior printed publications, and others). Such a database will also help examiners effectively to search and find any material art of which the inventor was not aware. The examiner must also examine the novelty and nonobviousness / involvement of an inventive step for every invention in order to ensure the quality of the patents that eventually will be issued.

²²⁹ Sterckx, S., 006. The Moral Justifiability of Patents. Ethical Perspectives: *Journal of the European Ethics Network*, 13(2), pp. 249-265.

However, before State Street Bank (1998) business method patents had never entered the public domain. It follows that the patent office data bases will not contain any detail of prior art. Therefore, "there is sparse business concept-related prior art by which patent examiners can construe novelty"²³⁰, and it has been suggested that as a result "invalid patents will inevitably issue."²³¹ The stock of prior art is limited not only in prior patent references but also in prior non-patent references. In the prior art database the lack of patent references is attributed to the fact that there are few if any previous business method related patents issued before the end of 1990s. Also, "very few of the previous innovations in this area, [which has been used before], were ever documented"²³². This has resulted the prior nonpatent references being inadequate.

The problems of evaluating business method patent applications in the patent offices are not merely due to the lack of access to prior art but also due to "less than sanguine [evaluations] about the patent examiners' ability to distinguish novel business concepts from the 'mere automation' of previously-known, manually-performed processes"²³³. Any affirmative search for prior art is exceedingly complex because "business methods predate the origin of the patent regime"²³⁴. As a result patent examiners currently could have very little experience in dealing with claims for business methods. Thus, patent offices' examiners will patent what they do not understand²³⁵, and thus results in a decrease in the quality of patents.

²³⁰ Makus, K. E., 2000. *Intellectual Property Rights in the Global Economy*. Washington, US: Institute for International Economics. The author stated the reason of lack of prior art: "Software and business methods traditionally relied on copyrights and trade secrets protection, neither of which provide formal disclosure of their technical aspects".

²³¹ Dreyfuss, R. C., 2000. Are Business Method Patents Bad for Business? *Santa Clara Computer & High Technology Law Journal*, **16**(2), pp. 263-280.

²³² Frieswick, K., 2001. Are Business Method Patent a License to Steal?, *CFO Magazine*, 1-Sep-2001.

²³³ Hunter, S. D., 2003. Have Business Method Patents Gotten a Bum Rap? Some Empirical Evidence. Mit Sloan Working Paper No. 4326-03.

²³⁴ Raskind, I. J., 1999. The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business. *Fordham Intellectual Property, Media & Entertainment Law Journal*, **10**(1), pp. 61-104.

²³⁵ Dreyfuss, R. C., 2000. Are Business Method Patents Bad for Business?. *Santa Clara Computer & High Technology Law Journal*, **16**(2), pp. 263-280.

Low patent quality increases patent licensing and litigation costs because bargaining becomes more difficult and the probability of patent disputes grows as quality deteriorates. Overly broad claims inappropriately expand the number of potential infringers and the probability of litigation. And when numerous inventors own related patents and patent applications there are apt to be disputes about priority or the scope of similar claims.²³⁶ Critics indicate this adverse impact also applies to business method patents. Shapiro (2001) states that "our current patent system is causing a potentially dangerous situation in ... E-commerce in which a would-be entrepreneur or innovator may face a barrage of infringement actions that it must overcome to bring its product or service to market. In other words, we are in danger of creating significant transaction costs for those seeking to commercialize new technology based on multiple patents, overlapping rights, and hold-up problems".²³⁷

However, the deficiencies of low patent quality (based on the problems within patent offices) are not inherent. More time and effort will bring the quality of such patent up to par through patent office reform.²³⁸ Feeling the pressure of the critics, the USPTO has taken steps to improve the quality of its examination corps and processes technologies related to electronic commerce and business methods. The first step that the USPTO took to reform in business method patent examination was to hire and train more examiners in Class 705. Some of them had work experience in business industries. According to the USPTO White Paper, 38 examiners now work in Class 705, and "4 have an MBA or other business degree, 4 have a JD degree, 4 have PhD degrees, and 7 have Masters Degrees, ... and 14 of them have business

²³⁶ Riordan, T., 2000. Patents: Historians Take a Longer View of Net Battles. *N.Y. Times*. 10-Apr-2000.

²³⁷ Shapiro, C., 2001. *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting. Innovation Policy and the Economy 1*. Cambridge: National Bureau of Economic Research.

²³⁸ Fine, G. S., 2001. To Issue or Not to Issue: Analysis of the Business Method Patent Controversy on the Internet. *Boston College Law Review*, 42(5), pp. 1195-1214. at page 1210. Fine summarized the argument as follows: "These quality arguments... Are rendered nugatory by the wait-and-see urgings of some pro-[business method patent] commentators. By definition, the prior art database will improve as a result of the influx of patent applications. The PTO has already gone on record saying that they will make the appropriate increases in manpower and expertise to provide the necessary review of the patent applications. Thus, with greater wealth of prior art to evaluate novelty and greater resources to ensure that patent applications are not overly broad, the major causes of poor quality patents are being eliminated."

experience ranging from banking and securities to real estate and insurance"²³⁹. Also, the Science & Technical Information Center - Electronic Information Center (STIC - EIC) founded by USPTO has been able to support the Class 705 examiners in locating additional electronic business literature sources and retrieving hard copy references, and is expanding its own conventional library. In addition, the STIC is attempting to collate its examining resources into a web-based search tool for the convenience and greater effectiveness of the Class 705 examiners. It has now been over ten years since USPTO started to reform their examination corps and processes in Class 705, and it is therefore an appropriate time to assess whether the quality of business method patents remain of low quality patent as the critics expected or whether things have improved as a result of the various reforms and innovations. If there has not been improvement in the US, then the argument should now be settled. The harm resulting from the inadequate prior art in business method patents, should not be a hamper to patent business method inventions in Europe. This is because the European Patent Office (and other related patent offices in member states) can take advantage of the USPTO's reforms and in particular the building database of prior art change these for European administration. The European Patent Office is also in a favorable position as it can identify failures in the US reforms.

1.8.3 Debates surrounding economic/social effects of patent mechanism

So far we have examined legal scholars' arguments based on policy and legal concerns, economic scholars and other political and social scientists are more likely to discuss business method patents on the grounds of the purposes of the patent applications: through encouraging innovation and disclosure of new inventions new technologies will be

²³⁹ United States Patent and Trademark Office, 2000. A USPTO White Paper – Automated Financial or Management Data Processing Methods (Business Methods). US: USPTO.

encouraged and ultimately national/regional industries and economies will develop²⁴⁰. These occurrences have been noted by more and more researchers.

The history of the patent systems has told us the only constitutionally-permissible purpose of a patent is ultimately to encourage innovation and the disclosure of new inventions in exchange for the granting of a limited monopoly right. The monopoly right will provide the necessary incentive for those who have developed a new and innovative product or process. However, for business method innovation Keeley-Domokos (1999) has asserted that an efficient market will reward the innovation sufficiently to encourage continual efforts to develop and to improve upon business methods.²⁴¹ Melarti (1999) disagrees and has stated that innovation in science and in business should depend upon different incentive structures.²⁴² Invention in science should be promoted by patent protection because "the time and resources required for scientific invention are difficult to recover in the open marketplace without limiting the ability of competitors to appropriate and market the new invention"²⁴³. However, the competitive advantage provided by business innovations in the market has created adequate economic incentives to encourage creativity and development in business. The reason businesses are motivated to develop new, innovative business methods is that they will "attract new customers, and those customers will be naturally more inclined to continue to bring their business to the same company rather than to switch to a competitor who later adopts the same methods"²⁴⁴. However, these criticisms are plausible but insufficient to support the singling out of business method patents for exclusion. Through reviewing the available public literature, we cannot find any empirical evidence to support the assertion that other incentives (apart from patent) are sufficient of themselves to encourage business

²⁴⁰ See section 1.4 Chapter 1 of this thesis.

²⁴¹ Smith, N. A., 2002. Business Method Patents and Their Limits: Justifications, History, and the Emergence of A Claim Construction Jurisprudence. *Michigan Telecommunications and Technology Law Review*, **9**, pp.171-209.

²⁴² Ibid.

²⁴³ Ibid.

²⁴⁴ Fink, M. E., 2004. Patenting Business Methods in Europe: What lies Ahead? *Indiana Law journal*, **79**(1), pp.299-321.

method invention. Having other incentive mechanisms is not a viable alternative to patent protections. A lack of patent protection may discourage the development of new business methods²⁴⁵ because the monopoly rights granted by a patent can prevent competitors from capitalizing, or "free-riding", on another's invention without contributing to the costs of developing that invention.²⁴⁶ In fact, incentives after these patent incentives exist in other industries, which can't show conclusively that business methods should uniquely be excluded from patentability. Fink (2004) has stated: "the first-mover advantage ... is applicable in nearly all industries: if a company develops any new and innovative product or service, it will naturally have the first opportunity to exploit that product or service and to establish an ongoing relationship with customers"²⁴⁷. These might suggest that there is always an advantage to be gained financially by those companies that achieve innovations production. The evidence shows that such advantages exist but may be of varying strengths and longevity. There is no longevity in a fashion industry – IT innovations in some sectors frequently have a high fashion element (e.g. Apples iphone) while in others (Amazon's one click) fashionable aspects are non-existent. On the contrary patent economics advantages will always reward an innovator.

Based on the social/public interest, to increase innovation for society as a whole, a disclosure of invention is necessary. The disclosure of an invention makes it possible for anyone to build a further new innovation using the disclosed invention as a foundation. Granting patents

²⁴⁵ Brown, P., & McCollester, L., 1999. Should We Kill the Dinosaurs or Will They Die for Natural Causes? *Cornell University Cornell Journal of Law and Public Policy*, **9**, pp. 285-310. At page 229 "without the security of knowing that the copyright and patent laws will protect particular manifestations of ideas, creators and inventors might be less inspired to devote efforts to such creation and innovation or might be reluctant or unwilling to make the fruits of their creative efforts available to others."

²⁴⁶ Some scholars have noted that business method patent may defy the anti-free-rider. For example: Dreyfuss (2000) stated that business methods do not provide a solution to the free-rider problem because "business methods are ... hard to free ride on" because they are largely designed around interpersonal interaction, business methods "depend in strong ways on the social structure within the firms utilizing them – on compensation schemes, lines of reporting, supervising policies, and other business factors. See Dreyfuss, R. C., 2000. Are Business Method Patents Bad for Business?. *Santa Clara Computer & High Technology Law Journal*, **16**(2), pp. 263-280.

²⁴⁷ Fink, M. E., 2004. Patenting Business Methods in Europe: What lies Ahead?. *Indiana Law journal*, **79**(1), pp. 299-321.

provides the public benefit of disclosure while the monopoly rights accompanying patent protection will protect the exploitation of the inventions. But monopoly rights can sometimes give an unfair advantage and therefore can stifle economic competition. If a patent system did not exist, inventions would be kept secret in order to return a competitive advantage. The critics indicate that it is not necessary to provide a patent incentive for businesses to disclose their business methods because business methods are openly practised in the market and they cannot be kept as a secret for long²⁴⁸. In this context, the benefit of disclosure will not apply to business method inventions. Therefore, patenting of business methods does not always result in the same positive social advantages as with other types of patents, but they embody all of the same costs²⁴⁹. However, as the definition of business method indicated, business methods are not just about customer service methods, but also include administrative methods. Whether customer service can be kept as a secret is worth consideration. Also, for customer service methods, the above criticisms rely upon anecdotal evidence rather than empirical analysis. Such anecdotal evidence is obviously of little use in evaluating whether the disclosure of customer service type business method inventions should be encouraged by granting patent protection.

In the view of the critics, not only is the patent protection for business method innovations unnecessary, but also the monopoly rights granted to business method innovations by patent can harm society as a whole. This negative commentary may be particularly obvious when one considers the economic impact of business method patents tailored for Internet usage. Technology publisher Tim O'Reilly implored Bezos to reconsider his position on the enforcement of business method patents, expressing concern for the continued development of the Internet. He argued that the spectre of patents will hamper the laissez-faire

²⁴⁸ Ibid.

²⁴⁹ Dreyfuss, R. C., 2000. Are Business Method Patents Bad for Business?. *Santa Clara Computer & High Technology Law Journal*, 16(2), pp. 263-280

development of the Internet that has been so successful to date.²⁵⁰ The vast majority of Internet businesses are small operations that lack financial capacity and there are financially vulnerable to objectives and counterclaims.²⁵¹ Business method patent may force small/start-up businesses to spend a lot of money to avoid litigation and/or to engage in patent prosecution, which "the businesses can ill afford"²⁵². Grusd (1999) concluded: "There is good reason to believe that the costs associated with competition blocking will be particularly amplified with regard to the Internet. This is so because patents on Internet business methods may signal the end of the barrier-free entry to commerce that has been the hallmark of the Internet. Not only can the existence of patents on Internet business methods impede new entrants from entering the marketplace, but it can ultimately bar existing parties from the market. This leads to reduced competition and ultimately market inefficiency."²⁵³ Also, the imposed costs will result in the consumer having to pay a higher price, for which the patent-provided monopoly allows, for the goods or services protected by business method patents.²⁵⁴ Therefore, trade secrets might get be a better choice to protect many Internet related business method inventions²⁵⁵. However, these harms are a corollary of granting monopoly rights. In fact, patenting every emerging technology could be subject to the same criticisms. Bringing negative impacts to small/start-up businesses. The monopoly rights simultaneously could result in certain positive benefits for small/start-up businesses. Business method patents provide e-commerce Internet startup companies the initial period of protection they need to develop their product and market position before being overwhelmed by larger, well-

²⁵⁰ Cited in Shumaker, S., 2000. Business Method Patents: Navigating a Sea of Controversy. [Online] Available at <<http://www.ssiplaw.com/files/busmethpat.pdf>> [Accessed 18 October 2009].

²⁵¹ Grusd, J. E., 1999. Internet Business Methods: What Role Does and Should Patent Law Play? *Virginia Journal of Law and Technology*, **4**(9), pp. 1522-1687.

²⁵² Tiller, E. H., & Allison, J. R., 2003. The Business Method Patent Myth. *Berkeley Technology Law Journal*, **18**(4), pp. 987-1084.

²⁵³ Grusd, J. E., 1999. Internet Business Methods: What Role Does and Should Patent Law Play? *Virginia Journal of Law and Technology*, **4**(9), pp. 1522-1687.

²⁵⁴ Dreyfuss, R. C., 2000. Are Business Method Patents Bad for Business?. *Santa Clara Computer & High Technology Law Journal*, **16**(2), pp. 263-280.

²⁵⁵ See: Grusd, J. E., 1999. Internet Business Methods: What Role Does and Should Patent Law Play?. *Virginia Journal of Law and Technology*, **4**(9), pp. 1522-1687. The author stated: "in the Internet Context, this [trade secrets] may be superior to patent protection because patents enable patent holders to exclude others' use of given business methods and thereby restrict healthy competition and increase administrative costs.

established competitors²⁵⁶. As a mechanism which has positive and negative impacts, the overall influence of the granting of business method patents should be evaluated by all market participants. Yet regrettably, to date most criticisms are not based on empirical analyses. Many of these stances are based on alarm or imagination.²⁵⁷

1.8.4 Summary

On the whole, although business method patents have now been recognised by law in the US and some business method related inventions have been granted de facto protection in Europe, the debate about the nature and applicability of business method patents is still ongoing. To examine matters further we shall focus on three issues, namely: (1) patent eligible subject matters and/or patentable subject matters, which will be addressed in Chapter Three and Chapter Four; (2) patent quality resulting from the ability of the patent office to administer patents correctly, which will be discussed in Chapter Five; and (3) the social and economic impacts of business method patents, which will be evaluated in Chapter Six. The substance of the above criticisms have ranged from the plausible to the puzzling, and the rhetoric from the cautiously alarmed to the outright polemical.²⁵⁸ The more anecdotal evidence and the less empirical analysis results in the production of the arguments which are not persuasive. Even some conclusions based on empirical analysis are also not convincing

²⁵⁶ See Gabay, S., 1999. The Patentability of Electronic Commerce Business Systems in the Aftermath of *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, *The Journal of Law & Policy*, **9**(1), pp. 179-226. At page 221: the author stated: "The legal monopoly over an aspect of e-commerce that a patent affords can provide a start-up with a significant advantage in operating and expanding its business. Patents on business methods are especially beneficial to Internet Start-up companies by protecting them from larger competitors imitating their potentially successful methods. Moreover, patents can also be marketing tools to make it possible for start-up companies to attract capital, launch products, and compete with more established players".

²⁵⁷ E.g. Raskind, I. J., 1999. The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business. *Fordham Intellectual Property, Media & Entertainment Law Journal*, **10**(1), pp. 61-104. He warns: "If the boom in business method patent continues at its accelerated pace, the so-called superhighway of electronic commerce could be partially converted into a toll road."

²⁵⁸ Tiller, E. H., & Allison, J. R., 2003. The Business Method Patent Myth. *Berkeley Technology Law Journal*, **18**(4), pp. 987-1084.

because of the lack of breadth of overall evaluation or for other reasons²⁵⁹. After more than 10 years development of business method patenting practice the trial period suggests interpretive conclusions and indicates that a uniform approach to business method patent claim construction is taking shape. It is time to revisit the business method patent jurisprudence. Over a long time period it is also now possible to evaluate comprehensively the overall influence of business method patents using empirical data.

1.9 Aim and research questions

The aim of this research presents an attempt at examining the applicability of the business method patents in the EPO (and comparing this with USPTO practice). This raises the following questions based on the above literature review:

(1) Whether the existing European Patent Convention can grant patent protection to business method – related inventions in Europe, and if yes, what business method – related inventions can be protected by patents. In other words, which kind of business method – related inventions can be granted European patent under the current legal framework provided by EPC excluded business method "as such" from the patentable subject matter.

(2) Since it is not worth issuing patent right to low quality invention in return for the disclosure of the invention, we must ask how to assess the patent quality and whether business method patents compliance with the patent quality by referring the US experiences in business method patents.

²⁵⁹ For example, when discussing the quality of the business method, Tiler & Allison employed a database that contains only the Internet business method patents issued through the end of 1999, whereas the business method patent is legally recognised from the end of 1998. And also the USPTO's reform related examining business method patent had not gone on yet.

(3) Whether it is justified to have business method patent protections in Europe based on economic justifications of patents, especially when compared and contrasted with the US position in patenting business method - related inventions.

Chapter Two: Methodology

In the previous chapter, the review of the literature enabled the definition and statement of the research questions. In line with these questions, this chapter will review and discuss the related legal research methodologies and techniques used in this study.

Legal research is "a fresh, diligent, systematic, inquiry or investigation of the factual data and/or theoretical concepts of the rules and principles of a particular legal issue in an attempt to discover, revise or improve the relevant concepts, theories principles and application".²⁶⁰

Legal research is concerned with numerous issues including the following: (1) the subject matter of the law; (2) the applicable rules and principles to the issues at stake; (3) objective analysis of the relevant facts, searching for their legal nature and meaning and finding the applicable rules and principles; (4) analysing the relationship between facts and law issues; (5) moving from facts to law; (6) legal theories and jurisprudential analysis of various legal systems and schools of jurisprudence; (7) enforcement of legal rules and various enforcement mechanisms and machinery; (8) legislation process, type and mechanisms; (9) sanctions and their legal effect and counter effect; (10) credibility & incredibility; (11) jurisdiction; (12) limitation of the applicable rules and principles; (13) procedures and their legal effect, (14) Interpretation; and (15) relationships and interrelationships between the conceptual elements of a particular topic vis a vis other legal topics and general legal principles.²⁶¹ These numerous issues indeed can be divided to two main types of questions: what is the law and what is the effect of the law.

²⁶⁰ Zahraa, M.,1998. *Research Methods for Law Postgraduate Overseas Students*. Glasgow: Glasgow Caledonian University.

²⁶¹ Ibid. at page18

2.1 The epistemology of legal research

The word "epistemology" is derived from the Greek word *ἐπιστήμη* (*epistēmē*) and *λόγος* (*logos*), the first meaning knowledge or science and the second signifying a theoretical and critical study of something.²⁶² Thus, linguistically, legal epistemology means "the theoretical study of legal science"²⁶³, which is closely associated with the theory and philosophy of the legal science.

Traditionally, legal epistemology was regarded as a reflection on the activity which "falls firmly within the bounds of jurisprudence"²⁶⁴. However, the legal research not only takes legal knowledge as an object of study and also studies "the modalities according to which assertions concerning (*portant sur*) the law are grounded and produced".²⁶⁵ Based on legal epistemology, Arthurs (1983) divided legal research into doctrinal and interdisciplinary research.²⁶⁶ There is also a third format of legal research which consists of either doctrinal or non-doctrinal or a combination of both performed using a comparative legal method.²⁶⁷

2.1.1 Doctrinal research

Doctrinal research (also called library based research) is the most common methodology employed by those undertaking research in law across the world. It is concerned with the

²⁶² Virieux-Reymond, A., 1972. *Introduction a l'epistemologie*, 2nd ed. France: Presses Universitaires de France. Cited in Sanuel, G., 2003. *Epistemology and Method in Law*. Hampshire: Ashgate Publishing.

²⁶³ Ibid. at Page 11

²⁶⁴ Susskind, R., 1987. *Expert Systems in Law*. Oxford: Oxford University Press.

²⁶⁵ Sanuel, G., 2003. *Epistemology and Method in Law*. Hampshire: Ashgate Publishing.

²⁶⁶ Arthurs, H. W., 1983. *Law and Learning: Report to the Social Sciences and Humanities Research Council of Canada by the Consultative Group on Research and Education in Law*. Canada: information Division, Social Sciences and Humanities Research Council of Canada.

²⁶⁷ McConville, M., & Chui W. H., 2007. *Research Methods for Law*. Edinburgh: Edinburgh University Press.

formulation of legal "doctrines" through the analysis of legal rules.²⁶⁸ The aim of the methodology is to predicate upon finding the "one right answer" to a particular legal question or set of questions. It is concerned with legal propositions and doctrines, not with people, social values and social institutions. Thus, under Doctrinal research, the research questions take the form of asking what the law is on a particular issue. Researchers who dwell in this type of research mostly focus on the nature of law and legal authority, the theories behind particular substantive areas of law, and the nature of rights, justice and political authority. Others may study the legal decision making process, and the theories of legal interpretation and legal reasoning.²⁶⁹ Since the start of the legal science, this methodology has been the main method adopted by legal researchers to carry out the legal research. Until now, doctrinal research still represents the "norm" within legal circles. Almost all legal researchers are familiar with the techniques.

However, doctrinal research is too narrow, since it is restricted to the formulation of legal "doctrines" through the analysis of legal statutes and cases (the sources of law in the common law system). It can only be ascertained by applying the relevant legal rules to the particular facts of the situation under consideration, and cannot explain, predict, or even understand human behavioural effects.²⁷⁰ As an internal participant-orientated epistemological approach to its object of study²⁷¹, Arthur (1983) therefore concludes that doctrine research, in asking what is the law, is "sometimes described as research within law"²⁷². In fact, the law does not

²⁶⁸ Within the common law jurisdictions legal rules include statutes and cases (the sources of law). See Knight, A. & Ruddock, L., 2008. *Advanced Research Methods in the Built Environment*. West Sussex: Blackwell Publishing Ltd.

²⁶⁹ Gordon, T. F., 2005. *Artificial Intelligence and Legal Theory at Law Schools. Workshop on International Conference for Artificial Intelligence and Law*. Italy: Bologna.

²⁷⁰ Chynoweth, P., 2008. Legal Research in the Built Environment: A Methodological Framework. In: International Conference on Building Education and Research (CIB W89 BEAR), [Online] Available at <<http://www.bear2008.org/post/192.pdf>> [accessed 15 March 2009]

²⁷¹ Hart, H. L. A., 1961. *The Concept of Law*. Oxford: Clarendon Press.

²⁷² Arthur, H. W., 1983. *Law and Learning: Report to the Social Sciences and Humanities Research Council of Canada by the Consultative Group on Research and Education in Law*. Canada: information Division, Social Sciences and Humanities Research Council of Canada.

operate in a vacuum. It operates within society and affects the society. As Lord Scarman, first Chairman of the English Law Commission, has stated: "There is no cosy little world of lawyers' law in which learned men may frolic without raising socially controversial issues ... I challenge anyone to identify an issue of law reform so technical that it raises no social, political or economic issue. If there is any such thing, I doubt if it would be worth doing anything about it"²⁷³. As the legal profession is increasingly being pulled into the larger social context, there is great need to consider the social, economical and political significance of the legal process. For example, an evaluation of the effectiveness of a particular piece of legislation in achieving particular social goals, or an examination of the extent to which it is being complied with. Doctrinal research methodology does not offer an adequate framework for addressing these issues. Thus, when the epistemological nature of research changes from that of internal enquiry into the meaning of the law to that of external enquiry into the law as a social entity, the legal research methodology moves toward interdisciplinary research, which emerged in the late 1960s and now has been taken up in most higher education institution as an extra dimension to legal studies. In the UK, for this terms which are often used are "law in context" and, increasingly, "socio-legal research"²⁷⁴.

2.1.2 Socio-legal research

Socio-legal research dates back 1960s. At that time, legal realists started the "law and society" movement, and pointed to the importance of understanding the gap between "law in books" and "law in action", and so examined the operation of law in society.²⁷⁵ Differing

²⁷³ Scarman, L., 1968. *Law Reform: The New Pattern*. London: Routledge & Kegan Paul.

²⁷⁴ Knight, A., & Ruddock, L., 2008. *Advanced Research Methods in the Built Environment*. West Sussex: Blackwell Publishing Ltd.

²⁷⁵ McConville, M., & Chui W. H., 2007. *Research Methods for Law*. Edinburgh: Edinburgh University Press.

from doctrinal research (which is a research in law), socio-legal research is a research about law and its effects. It is concerned with law as a social institution with the effect of law, legal processes, institutions and services, and with the influence of social, political and economic factors on the law and legal institutions. The purpose of this format of legal research is generally to facilitate future change, either in the law itself, or in the manner of its administration²⁷⁶. Therefore, this form of research was described by Arthurs (1983) as "law reform research"²⁷⁷. McConville and Wing (2007) defined socio-legal research (interdisciplinary research) as a legal research that employs methods taken from other disciplines to generate empirical data and to answer research questions.²⁷⁸ Socio-legal research allows the researcher to perform inter disciplinary research where he analyses law from the perspective of other sciences and employs these sciences in the formulation of the law. The starting point of the research is not law itself but rather problems in society which are likely to be generalised or generalisable. Here, law itself becomes problematic both in the sense that it may be a contributor to or a cause of the social problem concerned. Whilst law may provide a solution or part of a solution, other non-law solutions, including political and social re-arrangement, are not precluded and may indeed be preferred.²⁷⁹

In the patent law field, law and economics (also known as the economic analysis of law) has been emerging as the dominant theoretical paradigm and scientific methodology for socio-legal research²⁸⁰ since patents have been acknowledged as economic mechanisms. The

²⁷⁶ Knight, A., & Ruddock, L., 2008. *Advanced Research Methods in the Built Environment*. West Sussex: Blackwell Publishing Ltd.

²⁷⁷ Arthur, H. W., 1983. *Law and Learning: Report to the Social Sciences and Humanities Research Council of Canada by the Consultative Group on Research and Education in Law*. Canada: information Division, Social Sciences and Humanities Research Council of Canada.

²⁷⁸ McConville, M., & Chui W. H., 2007. *Research Methods for Law*. Edinburgh: Edinburgh University Press.

²⁷⁹ Ibid.

²⁸⁰ Landes, W. M., stated the economic analysis of law was crowned as "widely considered the most important development in legal thought in the last fifty years". See Landes, W. M., 2003. The Empirical Side of Law & Economics. *University of Chicago Law Review*, **70**, pp. 167-180.

economic analysis of law refers to the application of the methods of economics to legal problems. "Economic concepts are used to explain the effects of laws, to assess which legal rules are economically efficient, and to predict which legal rules will be promulgated"²⁸¹. As early as in the 18th century, Adam Smith discussed the economic effect of mercantilist legislation. In 1960s, Coase and Calabresi applied economics to analyse the law regulating nonmarket activities, which generally are seen as the starting point for the modern schools of law and economics.²⁸² Although for decades law and economics prospered mainly in North America, in the last decades it is rapidly increasing its influence also in Europe and elsewhere.

Generally, economic analysis of law seeks to answer two basic questions about legal rules, which are: (1) what are the effects of legal rules on the behaviour of relevant actors? and (2) are these effects of legal rules socially desirable? The economic analysis of law employs two different projects – normative analysis and positive analysis in answering these two questions.

2.1.2.1 Positive analysis

Positive analysis is a major branch of economics, which is "seeking with the assistance of mathematical models and empirical tools to provide us with explanation as to the causal connections between various variables, as well as predictions as to the effect of changes in one variable on others"²⁸³. The primary hypothesis advanced by positive economic analysis of law is the notion that efficiency is the predominant factor shaping the rules, procedures,

²⁸¹ Friedman, D., Law and Economics. In: Eatwell, J., Milgate, M. and Newman, P. (eds.), 1987. The New Palgrave: A dictionary of Economics. Basingstoke: Macmillan publisher.

²⁸² In 1960 Ronald Coase Published "The Problem of Social Cost", and later, in 1961, Guido Calabresi wrote "Some Thoughts on Risk Distribution and the Law of Torts". These two groundbreaking articles can be seen as the starting point for the modern school of law and economics. See Richard, P., 1983. *The Economics of Justice*. US: Harvard University Press.

²⁸³ Salzberg E. M., 2007. The Economic Analysis of Law - The Dominant Methodology for Legal Research?!. University of Haifa Faculty of Law Legal Studies Research Paper.

and institutions. Thus, the positive economic analysis of law can deal with the effect of different legal rules on various phenomena which the law is set to deal with, as well as the effect of different institutional factors on legal and judicial decision-making.

2.1.2.2 Normative analysis

In arguing for positive use of economics, scholars are not denying the existence of normative economic analysis of law due to the different objectives of economic analysis of law.²⁸⁴ To evaluate whether a particular rule is a good rule and what is the most desirable legal or constitutional arrangement or judicial outcome for a given problem, Normative economic analysis of law is used. Normative economic analysis is "applied to rank alternative solutions, or to tell us what is the desirable legal or institutional arrangements".²⁸⁵ Normative analysis can help us to evaluate various legal rules and judicial decisions. In fact, normative economic analysis of law is believed that it is a larger need for legal intervention in order to correct rules²⁸⁶.

Although socio-legal research avoids spending too much attention on describing and understanding rules of law and instead affords systematic and regular reference to the context of the problems which laws were supposed to resolve, the purpose they were to serve and the effect they in fact have, yet using socio-legal research could draw different conclusions on the

²⁸⁴ For example, Posner (1974) offers crime as an example. Positive economic analysis of law can help explain and predict how various punishments will affect the behaviour of criminals. It might determine that a certain sanction is more likely to deter a certain crime. While this analysis does not by itself mean that the law should be adopted, it can be used to influence normative economic analysis of law on whether the law would be beneficial to society. See Posner, R. A., 1974. Theories of Economic Regulation. *Bell Journal of Economics and Management Science*, 5, pp. 335-358.

²⁸⁵ Ibid.

²⁸⁶ Bouckaert, B. & Geest, G. D. (eds.), 2000. *Encyclopedia of Law and Economics: The History of Law and Economics*. Cheltenham: Edward Elgar Publishing.

same question because of differences in specification within the research design, or because of different methods of collecting data, or perhaps simply because the questions being researched are marginally different. In the economic analysis of the law, the approach ideally proceeds by constructing a mathematical model, generating testable hypothesis from it, and conducting the tests to see what happens. The diversity of different mathematical models will result in the researchers reaching the different conclusions when they adopt different models. It follows that criticisms of models and methods must be an important part of social-legal research when applied to specific problem situations.

2.1.3 The epistemology used in the thesis

As Chapter One has stated²⁸⁷, when considering the purpose of patents, the development of business method patents, as well as examining the European patent legal framework under EPC, and examining the applicability of the business method patents in the EPO, the following questions need to be answered: (1) what business methods can be granted European Patent protection under the current legal framework provided by EPC; (2) whether the business method patents are really low quality and therefore should not be accepted; and (3) whether it is necessary and/or adequate to introduce business method patent protections in Europe, especially when the European position is compared and contrasted with the US position.

The Question One is concerned with the European Patent Convention, the groundwork law governing the granting of European patents. The question therefore sets out to answer what in precise terms is the patent legal framework provided by generally EPC patenting of and what

²⁸⁷ See Section 1.9 Chapter One.

are the provisions which specifically relate to the business method - related inventions. Doctrinal research is obviously the appropriate methodology to use to answer this question.

However, this research does not limit itself to clarifying what is provided by EPC for patenting business methods. The author also hopes that the research can play a positive role in evaluating the European policy related to the business method patents. Based on this purpose, we move on to the other two questions of this research which focus on whether patenting business method - related inventions is rational and appropriate. This thesis will discuss the rational of business method patents in two ways: first, when business method - related inventions are patented, can they fulfil the quality requirements for patents; second, we examine the impact of patenting business method - related inventions and ask whether Europe should adopt business method patents as has been done in the US. To answer these two latter questions we need to look at the effect of business method patents on society. Thus social-legal research (interdisciplinary research) will be used in the research relative to those two latter questions. Since clearly one purpose of these two questions is to evaluate whether granting patents for business methods is desirable, the type of analysis we shall use in the research will be that of normative analysis. The factors surrounding general patents will be regarded as a "norm" in this research to justify business method patents. Thus, if the quality of business method patents overall is higher than or equal to the quality of general patents, and the positive and negative effects of business method patents are similar to the like effects relating to general patents (or the business method patents will be shown to have fewer negative effects in return for greater positive effects than with the general patents), then granting business method patents will be regarded as a desirable outcome.

2.2 Research methods in the study

Research method is "the way the researcher is going to collect, discuss, explore, explain, test, verify, interpret and present the required information"²⁸⁸, which is the basis upon how to conduct research. Legal research provides no exception to this ideal thus our legal research method will be "utilised to discover the principles and rules, ... , and to the determination of a particular problem or controversy".²⁸⁹ "It [legal research] is a skill much developed by experience and extensive acquaintance with the legal system in question".²⁹⁰

The choice of research method is one of the most decisive decisions that affects the success or failure of the research outcome. It is important to use extra care in the process of identifying the appropriate research method. Zahraa (1998) identified the aspects that need to be taken into account in the process, which includes: appropriately selecting the research topic (e.g. to investigate the crime of rape in a certain region the researcher generally will use statistics analysis or questionnaires), the available research budget (e.g. field research is likely to cost more money than other forms of research), the capability of the researcher (e.g. the social or political status of the researcher may give the researcher more opportunities to collect data from prospective interviewees), the available time etc.²⁹¹

In the previous section, on the epistemology of legal research, the author has identified that the thesis will utilise a combination of doctrinal research, socio-legal research and comparative legal research. According to the aspects that need to be taken into account in choosing the research method, the following method will be used in this study.

²⁸⁸ Zahraa, M., 1998. *Research Methods for Law Postgraduate Overseas Students*. Glasgow: Glasgow Caledonian University.

²⁸⁹ Walker, D., 1980. *The Oxford Companion to Law*. Oxford: Clarendon Press.

²⁹⁰ Ibid.

²⁹¹ Zahraa, M., 1998. *Research Methods for Law Postgraduate Overseas Students*. Glasgow: Glasgow Caledonian University.

2.2.1 Method used in legal doctrinal research part of the study

The research question, what business method can be granted a European Patent under the current legal framework provided by EPC, is a question concerning the legal regulations of the European patent system, which obviously belongs to the domain of "what is law". To answer a question concerned law itself, doctrinal research is an appropriate and exclusive approach in legal research on this question. Only one exclusive research method can be used in the legal doctrinal research, that which is called "black-letter law".²⁹² "Black-letter law" is a method used "to exposit and analyse legislation and case law and integrate statutory provisions and judicial pronouncements into a coherent and workable body of doctrine"²⁹³. It, focuses heavily, if not exclusively, upon the law itself as an internal self-sustaining set of principles which can be accessed through reading court judgments and statutes with little or no reference to the world outside the law.²⁹⁴ Based on the first research question of this research, the legislation used in this thesis includes the European Patent Conventions (EPC) and the Guidelines for the Examination in the EPO (EPO Guidelines), which are the main statutory provisions for European patents²⁹⁵. It needs to be mentioned here in the thesis, that there are two versions of the European Patent Convention to be used: the European Patent Convention 1973 (EPC 1973) and the European Patent Convention 2000 (EPC 2000). The EPC 2000 is the newest version of the European Patent Convention as revised by the Act Revising the Convention on the Grant of European Patents signed in Munich on 29 November, 2000. On 28 June, 2001, the administrative Council of the European Patent

²⁹² McConville, M., & Chui W. H., 2007. *Research Methods for Law*. Edinburgh: Edinburgh University Press.

²⁹³ Brownsword, R., 2006. An Introduction to Legal Research. [Online] Available at <http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_grants/documents/web_document/wtx030897.pdf> [Accessed 7 May 2008].

²⁹⁴ McConville, M., & Chui W. H., 2007. *Research Methods for Law*. Edinburgh: Edinburgh University Press.

²⁹⁵ For the relative provisions of the EPC used in this thesis see Appendix 2.

Organisation adopted the final new text of the EPC 2000. The EPC 2000 entered into force on December 13, 2007. Due to the fact that most European cases and literature were published before 2007, if no particular indication is made in this dissertation, then the "European Patent Convention" or "EPC" herein means the European Patent Convention 1973 version. The cases analysed in this research are the decisions of the EPO Boards of Appeal, and the EPO Technical Boards of Appeal as well as the EPO Enlarged Boards of Appeal. The boards are integrated into the organisational structure of the EPO and are independent from the EPO office in that their decisions are bound only by the European Patent Convention (EPC). Although strictly speaking a decision of a Board of Appeal is only binding on to the department whose decision was appealed, insofar as the facts are the same (if the case is remitted to the first instance of course)²⁹⁶, yet, "[if] the decision which was appealed emanated from the Receiving Section, The Examining Division shall similarly be bound by the ratio decidendi of the Board of Appeal"²⁹⁷. Hence, the decisions set precedents and so still have clear implications for the European patent system. The standards used to choose the decisions analysed are based: (1) on how often they are repeated or referred to in the literature which discusses business method patents in the EPO; and/or (2) on how often they were cited in the decisions concerning patenting business method-related inventions; and (3) on where for separate reasons the author believes a case to be representative. Totally six decisions of the Boards of Appeal (or the Technical Boards of Appeal, or the Enlarged Boards of Appeal) of the EPO are analysed in Chapter Three of this thesis. All legislation and judicial pronouncements are the primary data which come from the European Patent Office.

To discuss whether business method – related inventions can and should be patented in Europe, the US experience is an important source of information now that the US has

²⁹⁶ Article 111 (2) EPC 2000.

²⁹⁷ Article 111 (2) EPC 2000.

explicitly accepted the patentability of business method – related inventions since 1998. Also, the US position in business method patents is very important in discussing the possible effects of business method patents if these were introduced similarly into Europe. We must also be aware of the difference between US and Europe current patenting of business method – related inventions as if the current provisions were contrasted then thus could result in a lopsided development in the economic field which could harm European interests. Hence, we need to understand fully what is the current US position regarding the patentability of business method patents and what are the differences in the legal framework for granting patent to business method – related inventions between the US and Europe, which are the preconditions continuing the studies.

Thus, the Chapter Four summarises the current law and the judicial history of patenting of business method – related inventions in the United States of America, and in that chapter we undertake an in-depth analysis of relative US patent cases. Through the use of the "black-letter law" method, the US position in patenting business method-related inventions will be analysed. The principal statute related to that chapter is the US Patent Act (35 U.S.C)²⁹⁸. The cases chosen in the research come from the Court of Appeals for the Federal Circuit (CAFC) and the Supreme Court²⁹⁹. The other sources used in Chapter Four include the official documents (e.g. the Manual of Patent Examining Procedure (MPEP) of USPTO, and some research papers).

There after a comparison between the European patent legal framework and the US patent legal framework in patenting business method-related invention will be conducted. The similarities and dissimilarities between Europe and US in patenting business method - related

²⁹⁸ The essential provisions of 35 U.S.C. used in this thesis are given in Appendix 1.

²⁹⁹ Totally eleven decisions from the US Court of Appeals for the Federal Circuit (or the US Supreme Court) are analysed in Chapter Four of this thesis.

inventions will be identified. The comparison and contrast also may be able to provide new ideas for the European and US policy makers and other stakeholders for the consideration of future developments in the two patent systems and in the harmonisation of patent law if this should appear appropriate.

2.2.2 Methods used in socio-legal research part of the study

Regarding the other questions in this research: first is whether the current protection of business method-related inventions under the European patent legal framework is adequate, this concerns the effect of the European patent law on social and economic factors and equally, and vice versa, the effect of social and economic factors on the law; second if business method - related inventions are granted patent protection, whether they can fulfil the quality requirements of general patents. These two questions are clearly outside the purview of the law itself and cannot be answered by the "black-letter law" method. To answer these latter questions, the "law in context" (socio-legal) approach is adopted in this thesis.

Socio-legal research is "a systematic method of exploring investigating, analysing and conceptualising certain facets of social life in order to contribute to legal knowledge".³⁰⁰

There are no special methods besides those already used in the social sciences for socio-legal research, which includes the various methods adopted in the social science research. Conventionally, legal researchers are more likely to use dialogical analysis method in socio-legal research to justify the law, i.e. why the law is as it is? However, this is not the main thrust of this thesis which is whether business method related - inventions should be granted patent protection in Europe when the economic theory of the patents is considered.

³⁰⁰ Amin, S. H., 1992. *Research Methods in Law*. Glasgow, Royston Publication.

2.2.2.1 Statistical analysis

To discuss the question in the research which is concerned with the quality of business method patents and answer whether the business method - related invention can qualify to be patented given that opponents think that business method patents are or would be a low quality patent and therefore cannot contribute novelty and nonobviousness or lack an inventive step³⁰¹, the first step in the research is obviously to find a measure for the quality of business method patents. A patent represents a bargain with society. The patent offers the inventor a monopoly right in exchange for the disclosure of the invention's details to the public instead of keeping them secret. To justify such a grant, the inventor must prove the quality of the invention is worth the exchange. The problem for this research is that the quality of a patent is an elusive concept. Also, the research needs to assess the overall quality in certain type of patent. Hence, it is essential to find measurable indicators of patent quality which are observable characteristics of a patent that are believed to be driven by patent quality. Economic scholars have found in the patent procedure "prior art" references some very important factors to evaluate whether the claimed invention meet the patentability requirements (novelty and inventive step/nonobviousness). Also, if a patented invention has been cited as "prior art" references in follow-up inventions, this means it has proved itself valuable and so justified use of the temporal exclusive rights in exchange for the disclosure of the invention.³⁰² Therefore, it is reasonable to believe that the number of citations received by posterior patents (thereinafter called "forward cites") and the number of citations made to previous patents (thereinafter called "backward cites") can be used as a ready measure reflecting patent quality and hence belong to the indicators of patent quality that we seek.

³⁰¹ See section 1.4 Chapter One.

³⁰² See Section 5.1 Chapter Five.

Accordingly, the author has reason to believe that the number of "backward cites" / "forward cites" of a business method patents equate with quality, or even more than this, that from the occurrence of the same number of "backward cites" / "forward cites" in general patents, the quality of business method patents can be regarded as having the same patent quality with that of the general patents with the same number of cites. The arguments provided by the opponents, that business method patents involve a lack of quality, will be proved false by this method. Thus the research method to answer the question of quality is a comparison of the number of backward cites (which will be divided to patent references, non-patent references and total references in the analysis) and the number of forward cites between business method patents and general patents. However, due to fact that the EPO does not overtly accept business method patents but the USPTO does, the systematic data related to business methods will be more conveniently found in the USPTO than in the EPO. Of significance is that this data related to these indicators is easily found on the official website of the USPTO (<http://www.uspto.gov>). Hence, the author has decided to conduct a statistical analysis of the data came from USPTO (see appendix 3: Data for Statistical Patent Quality Analysis), and draw conclusions which will be used as a reference to assess whether the quality of patented business method - related inventions can fulfil patent quality requirements if Europe accepts the patent protection for business method - related inventions. Hence the empirical study looks primarily at quantitative data rather than the quality of the information provided in the patents applications and grants. Prior to this study Hunter (2003) conducted a correlation statistical analysis, which focused on the correlation between business method patents "backward cites" and general patents "backward cites", in order to evaluate business method patents quality³⁰³. However, this thesis proceeds differently from Hunter's study (2003). The current research focuses on the differences in patent quality between patented business

³⁰³ Hunter, S. D., 2003. Have Business Method Patents Gotten a Bum Rap? Some Empirical Evidence. Mit Sloan Working Paper No. 4326-03

method inventions and other patented inventions since the aim of the current research is to evaluate whether patented business method inventions have similar or higher quality than the commonly accepted patented inventions. This means that business method inventions and other patent inventions should be regarded as two independent groups. Thus, the current research will adopt independent samples t-test statistical analysis technique, which is a technique used to test for a difference between two independent groups on the means of a continuous variable, to compare the means of (1) the number of total prior art references (backward cites); (2) the number of non-patent prior art references (backward non-patent cites); (3) the number of patent prior art references (backward patent cites); and (4) the times a patent is cited by subsequent patents (forward cites) between business method patents and other general patents. If the comparison shows that the means of business method patents in these indicators is similar or higher than other general patents, it is rational to believe that patenting business method inventions can fulfil patent quality requirements and is acceptable. In the empirical study, the primary data for the statistics analysis were obtained through a search from the USPTO Patent Full-Text and Image Database that can be found on the website of the USPTO. Two data sets were collected in this research. The first was a set of 1459 randomly selected patents issued between 1999 and 2009, whose classification was Class 705, which will be regarded as business method patents database in this study. The second data set was a set of 1356 randomly selected utility patents (hereafter as GP for "general patents") which excluded the patents in Class 705 during a contemporaneous time period, which will be regarded as general patents database in this research³⁰⁴. The collected number of patents for every year in every category is over 100 patents. The number of

³⁰⁴ Although some patents which are in the other classification than Class 705 and still can be regarded as business method patents (see Section 1.3.1 Chapter One) according the definition of business method inventions provided in Section 1.3 of Chapter One, considering the huge number (hundreds of thousands) of patents issued by USPTO every year and the number of business method patents excluded from Class 705 is rare, the possibility that business methods patents excluded from Class 705 were chosen as general patents in the second data set is remote. Furthermore, even if several such inventions were chosen, when they were pooled the thousands general patents database, the impact would be insignificant. Therefore, this would not cause significant impact on my analysis and findings in this research.

“backward cites” and “forward cites”³⁰⁵ in every randomly selected business method patent / general patent are listed in Appendix 3 and are analysed in Chapter Five. The SPSS tool, a very widely used computer program designed to aid the statistical analysis of data easily, is adopted in Chapter Five to conduct the independent samples t-test.

2.2.2.2 Content analysis

The last part of this research in Chapter Six will examine the impact of business method patent in Europe, especially when the US position is considered. We shall attempt to answer whether business method patents should be adopted in Europe. If it is acknowledged that the patents are an economic mechanism, the economic analysis of law certainly is the appropriate approach to conduct the research into this question. In the economic analysis, to determine whether a new type of invention should be granted patent protection, the most common approach will be the "cost - benefit analysis". As its name suggest, cost - benefit analysis is used in the assessment of whether a proposed policy is worth doing. It involves comparing the total expected costs of each option against the total expected benefits, to see whether the benefits outweigh the costs and by how much. Under the analysis, to determine whether to grant patents for a certain type of invention depends on whether doing so will outweigh the social costs with respect to the type of invention, regardless of how the granting or denial of any one patent will affect individuals in that instance. However, a problem in cost - benefit analysis is what the social costs of a patent are. The author acknowledges that there is no single answer to the question of the right cost figure to use. The incorrect measure of cost will lead to an incorrect evaluation of consequences. The most important form of cost - benefit is analysis that is based on a complex mathematical model. Unfortunately the author lacks the

³⁰⁵ Considering it need a time period to produce the impact in forward cites, the author only chose the samles between 1999 and 2005 from the database to conduct the comparison of forward cites. In total, 999 business method patents and 915 general patents from 1999 to 2005 are used to analyse in Chapter Five.

advanced mathematical ability with which to prepare advanced mathematical cost - benefit analyses but such would in any event complicate this preliminary study. It must be acknowledged that the evaluation of economic impacts is very important in deciding whether business method patents should be accepted in Europe. As a result the author has used a more qualitative, or at least semi quantitative analysis of costs and benefits to show whether the conclusions reached in this study is justified on the basis of information currently available and that the conclusions made there from are valid. The author's alternative approach was preceded by contemplating alternatives. Initially, the author proposed a questionnaire - based survey to analyse the economic effect where a business method - related invention was patented. The questionnaire - based survey is a method of socio-economic analysis. It is cheaper, quicker, uniform and convenient for respondents. However, as a new issue in business fields, many businessmen were completely unfamiliar with business method patents, which resulted in difficulty in selecting target respondents. Furthermore, in the procedure to formulate the questions of the questionnaire, the author found that a similar research method had been adopted in previous research related to an evaluation of business method patents in Europe, and in particular in (1) the UKPO (United Kingdom Patent Office) consultation (2000)³⁰⁶ and (2) Hart & Pitkethly's publication (2003). As a result it was not necessary to do this part of the evaluation de novo but it was possible instead to adopt the findings of these two questionnaires based researches – but only where the methods appeared rigorous and justifiable.

In 2000, the UKPO conducted a consultation, which was entitled "Should Patents Be Granted for Computer Software or Ways of Doing Business", to call for submission of opinions on software and business method patents for "the industry" (that is, patent lawyers wearing the

³⁰⁶ UK Patent Office, 2000. Should Patents Be Granted for Computer Software or Ways of Doing Business? The Governments Conclusions

hats of company clients). In the consultation, the UKPO received 284 responses to the invitation to submit view, which comprised 239 individuals and 45 organisations (companies, trade and professional bodies, and so on). Although the consultation failed to produce the desired support, which resulted in the UKPO simply reinterpreting the results, the responses of the consultation are still very useful as a means of analysing the possible impacts of adopting patenting of business method - related inventions in Europe. This is because the responders in the UK consultation had a rich knowledge of the industry relating to business methods.

There were problems related to the designing of an objective consultation questionnaire and interpreting the responses. These problems were that the consultation set out to justify software patents and separately the respondents' knowledge tend to be related to the software enabled business method industry. Many of the responses were based on the speculation of the responders because, after all, in Europe business method patents are not granted explicitly. This had the effect that the limited experience of the respondents may have resulted in the inaccurate answers to the questions of the consultation and in addition have generated the error in considering the actual impact of business method patents.

Thus, in 2003 Hart & Pitkethly completed a report, which is called "Business Implications of Business Method Patents" as a supplement to UKPO's consultation (2000). The report is a summary of three previous studies carried out by the authors, which comprised: (1) a series of interviews with interested parties in the US and addressed the situation in the US regarding business method patents as well as the effect of business method patents for these various parties involved; (2) a survey of the UK venture capital industry with a web based questionnaire to discuss whether the possession of business method patents by a UK

company would encourage investment based on the conclusion of the previous interviews which is a possible relationship exists between the business method patents and the venture investment; and (3) a study of whether UK firms might, even if UK business method patents were unobtainable, be subject to action for infringement of US business method patents where internet related inventions are used by US customers accessing UK servers since the interviews had indicated US infringement risks for UK companies if Europe/UK does not follow the US in patenting business method - related inventions.

In the research, the respondents of the Hart & Pitkethly interviews included US Attorneys working in leading Law firms, US leading Academic Lawyers, US government and former government officials and Corporate Patent Attorneys working in major Computer Software and Wall Street Institutions, as well as a Dot.com entrepreneur and a Journalist working in this field, who are familiar with business method patents. Also interviews were conducted in a reliable manner, using semi-structured interviews, to collect the data. In the second part of Hart & Pitkethly's research they discussed the possible effect of business method patents for venture capital investment in the UK. The respondents of this second survey were obtained from the British Venture Capital Association list of members (2001), British Venture Capital Association list of Sources of Business Angel Capital (2001) and others from the UK national Business Angels Network directory. From the 1045 requests 139 completed questionnaires were returned, which gave an effective response rate of 11.8%. Considering the status of the respondents, who are the British experts in the venture capital field, these professional respondents gave a more accurate conclusion for the effect of business method patents in the UK's venture capital sector. Also of the 139 completed questionnaires, 25 of the respondents were from the Business Angel Finance related companies and this ensured that the survey covered the initial start-up stages of finance. In the third part of their study, Hart and Pitkethly

assessed the possible indirect or direct infringement risks for European business method on-line service providers in the United States Courts through analysing the US legal provisions³⁰⁷ and some related publications.

After reviewing these two studies (the UK consultation (2000) and Hart & Pitkethly's follow up assessment), the author acknowledges that it is rarely possible to do better in discussing the economic effect in choosing questionnaires as the prime research method to collect the data. But the author is also aware of limitation in these two studies.

In the UKIPO's consultation, the emphasis of the consultation was to justify software patents and there was a paucity in the respondents' knowledge surrounding the software business method industry. Most of the responses were based on the speculation of the responders because, after all, in Europe business method patents are not adopted explicitly. The limited experience of the respondents may also have resulted in inaccurate answers to the questions of the consultation and so generated error in estimating the actual impact of business method patents. Although Hart and Pitkethly attempted to remedy the defects of the UK consultation through interviewing experienced interested parties of the US, yet, the starting point of Hart and Pitkethly was to find the available evidence to support the protection of patents in business method - related inventions since the UKIPO's consultation (2000) concluded "those who favour some form of patentability for business methods have not provided the necessary evidence that it would be likely to increase innovation. Unless and until that evidence is available, ways of doing business should remain unpatentable"³⁰⁸. Thus, when Hart and Pitkethly (2003) formulated the questions for their interviews, the questions inevitably were directed towards considering the possible effects of extending patent protections for business

³⁰⁷ E.g. 35 USC 271, Process Patent Amendments Act of 1988

³⁰⁸ Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute.

method inventions in UK/Europe. However some other possible effects which might be used to oppose an extension of business method patent protection were not considered by Hart and Pitkethly in designing their interviews. In selecting the respondents of the interviews, the authors selected people who were more likely to support business method patents in the US. The majority of the respondents were patent Attorneys. Therefore, these two studies are valid but possibly lack reliability. However, they remain the most useful clues in evaluating whether Europe should accepted business method patents on the ground of the economics of such patents.

At the same time, the author also found some other researchers had paid attention to the economic effects of patents and published some papers discussing this topic³⁰⁹. The classical justifications in favour of patents have indeed given guidances in deciding whether a certain type of invention should be granted patent protection. Therefore, the author decided to adopt the content analysis method in this thesis to analyse the possible effects if Europe explicitly adopted business method patents. Content analysis is a technique for gathering and analysing the content of text.³¹⁰ With content analysis, it is possible to compare content across relevant texts and provide insight into complex models of past studies.

In this section of the research, the author assumes that if the impact of business method patents can fit with the ordinary justification of patents and its impact is similar as that for general patents (in other words patenting business method - related inventions will offer more or equal benefits with fewer harms than patenting the general patentable inventions), patenting business method - related inventions will be regarded as be appropriate for the

³⁰⁹ E.g. Machlup, F., & Penrose, E., 1950. The Patent Controversy in the Nineteenth Century. *The journal of Economic History*, **10**(1), pp. 1-29; Dutton, H. I., 1984. *The Patent System and Inventive Activity During the Industrial Revolution*. Manchester: Manchester University Press. etc.

³¹⁰ Neuman, W. L., 2003. *Social Research methods: Qualitative and Quantitative Approaches*. US: Pearson Education.

EPO.³¹¹ Based on this assumption, the four classical economics and philosophical justifications of patent were first indicated, which give a theory directed towards justifying patents and the scope of patentable subject matters. A literature survey method will be adopted to collect the data used to analysis the impact of general patents. A literature survey is based on books and academic publications and to gather a basis for the practical work. Through the use of key words "patent", "impact" or "effect", and / or "economic", the author searched the publications from Internet and the databases of the Scotland National Library, and found decades of related research papers and books. Furthermore the author investigated the bibliographies of these publications to enlarge the scope of related documents. After examining the content of this mass of literature, some typical documents, relevant to the empirical study, were identified with which to conduct a qualitative content analysis in order to summaries the impacts, especially the benefits, of general patents. Much of this research is reposted in Chapter six of this thesis.

After analysing the impact of general patents, the author attempts to summarise the impacts of the patentability business methods in Europe. The responses of the UKPO's consultation (2000) and the publication of Hart and Pitkethly (2003) will be used as the main resources with which to conduct the qualitative content analysis. The original consultation responses were gathered from the General Enquiry office of UKIPO (United Kingdom Intellectual Property Office). To avoid insufficient reliability, some other empirical studies which related the impact of business method patents were also searched and used to supplement the data.

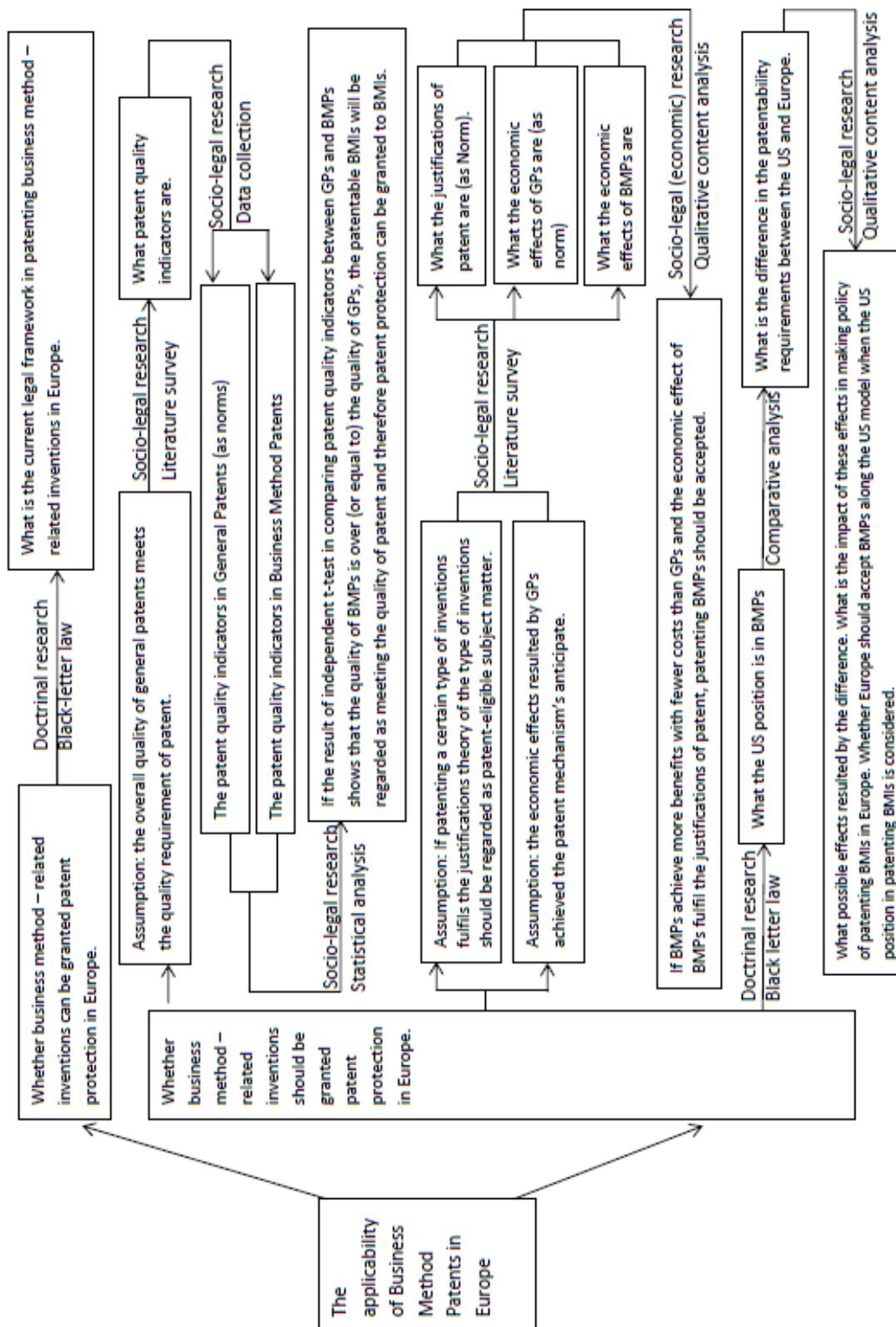
2.3 Summary of methodology

³¹¹ Due to the purpose of the research, this study does not justify the existence of patents in general. Hence, if the impact of a business method patent is similar to general patents, it is reasonable to believe that business method - related inventions should be regarded as general inventions for the purpose of patent protection.

Overall, the research triangulates black letter law approach, the statistical analysis method and the qualitative content analysis method. Triangulation research is defined as “the mixing of data or methods so that diverse viewpoints or standpoints cast light upon a topic”³¹². As a process "using more than one method or source of data in the study of social phenomena"³¹³, the combined research methods can together access different levels of reality and explain more fully than can be achieved from one standpoint alone. The objective of this research being to assess the applicability of business method patents in Europe, involves two questions: how for Europe can currently patent business method – related inventions and whether Europe should further adopt patent business method – related inventions (in line perhaps with the US model). Whether Europe can patent business method – related inventions is a question which relates to the current legal framework relating to business method patents, and the research is therefore conducted through the traditional legal research method, black letter law, in this thesis. The study also sets out to answer whether Europe should adopt business method patents. For this the research elaborates three aspects: (1) whether business method – related inventions can qualify the quality requirements of patent; (2) whether the economic justifications of patents support / oppose the granting of additional patent protections to business method – related inventions; and (3) when the US position in patenting business method – related position is considered, whether Europe should adopt business method patents along the US model. The interdisciplinary research (socio – economic analysis) is used to give a more detailed and balanced picture of the applicability of business method patents to Europe and to compensate for the insufficient results which would be obtained by doctrinal research alone. The following figure describes the triangulation of this research.

³¹² Olsen, W. K., 2004. *Triangulation in Social Research: Qualitative and Quantitative Methods can Really Be Mixed*. Ormskirk: Causeway Press

³¹³ Bryman, A., & Bell, E., 2003. *Business Research Method*. Oxford: Oxford University Press.



Chapter Three: Business method patent in Europe

The aim of this chapter is to demonstrate the ambiguity of the EPO Board's practice in patenting business method - related inventions from two dimensions. Part 1 interprets the provisions related to the patentability criterion under the EPC in the context of business method – related inventions as a back drop of the analysis in part 2. Part 2 presents examples of patents for doing business or patent applications for doing business, which were appealed to the EPO Boards of Appeal after being rejected by the Examination or opposed by the opposing Division and provides an in-depth analysis of the cases in order to find the EPO's attitude in patenting business method – related inventions.

3.1 Patentability

3.1.1 Statutory subject matter

That a patent involves a statutorily approved subject matter is a "precondition" for patentability, anterior to any other legal evaluation. The Article 52 (1) of the EPC (1973) provided a general provision of "patentable invention" and reads as follows: "European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step". Following with the new developments in International law, especially those of the Agreement on Trade - Related Aspects of Intellectual Property Rights (TRIPS Agreement) and of the Patent Law Treaty (PLT)³¹⁴, and to add a level of judicial review of the Boards of Appeal decisions, the EPC (1973) was revised by the Act Revising the Convention on the Grant of European

³¹⁴ The Patent Law Treaty (PLT) is a patent law multilateral treaty concluded on 1 June 2000 in Geneva, Switzerland, by 53 States and the European Patent Organisation. Its aim is to harmonize formal procedures such as the requirements to obtain a filing date for a patent application, the form and content of a patent application, and representation. The PLT entered into force on 28 April 2005.

Patents signed in Munich on November 29, 2000. In the newest revision (EPC 2000) in order to bring Article 52 (1) EPC into line with Article 27 (1) of the TRIPS Agreement³¹⁵ and make clear that patents shall be granted for inventions "in all fields of technology" which was specified by the Boards of Appeal, the Article 52 (1) was amended as: "European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application", which constitutes the basic patentability provision under the EPC. This change can be viewed as making a general statement on patentability which is subsequently made more specific by the list of excluded items given in Article 52 (2) EPC. As such, the change does not seem to lead to any substantial modification to the scope of what is considered patentable because the technical character had been accepted de facto³¹⁶.

3.1.2 Exceptions to Patentable Subject Matter

Article 52 (2) of the EPC provides a nonexhaustive list of what are not to be graded as inventions within the meaning of paragraph 1 and therefore not patentable subject matter:

The following in particular shall not be regarded as inventions within the meaning of Paragraph 1: (a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; (d) presentations of information.

³¹⁵ Article 27 (1) of the TRIPS agreement reads as follows: Subject to the provision of paragraph 2 and 3, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application. Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.

³¹⁶ See section 3.1.3 Chapter Three of this thesis

However, in paragraph 3 of Article 52, the provisions of paragraph 2 shall exclude patentability of the subject-matter or activities referred to in that provision only to the extent to which a European patent application or European patent relates to such subject-matter or activities **as such**. Thus, for an invention which is related a method for doing business (i.e. business method - related invention) Article 52 (3) seems to address that only business method "as such" should be excluded from the exceptions to patentable subject matter.

Thus, to interpret the exceptions to patentable subject matter, the first step is to understand the literal meaning of the paragraph 3 of Article 52 EPC. However, the paragraph does not clearly specify the subject matter which is non-patentable "as such". Rather it says that the paragraph 3 applies to the mentioned "subject - matter and activities" in paragraph 2, which could include two different meanings³¹⁷: (1) all the fifteen mentioned "subject – matter and activities" categories, which is listed in paragraph 2, "as such" should be excluded from the patentable subject – matter; or (2) only some of the 15 mentioned "subject – matter and activities" categories, which listed in paragraph 2, "as such" should be excluded from the patentable subject – matter. This means the policy makers may regard any "methods for doing business" should be excluded totally from the patentable subject – matter. Or the policy makers only anticipated the "methods for doing business" should be excluded from the patentable subject - matter with a limitation - "as such" (i.e. Only business methods "as such" belong to the exceptions to patentable subject matter).

However, the provisions of the EPC do not give a clear answer to this question. So whether "methods for doing business" should be excluded totally or only "as such", we have to find the real intention of the legislation, i.e. what the legislature thought when they framed Article

³¹⁷ Hansen, K. G., 2004. Software Patents in Europe. *Scandinavian Studies in Law*, **47**, pp. 173-201.

52 of the EPC, as revealed by a historical interpretation of the travaux préparatoires.

The legislative history might be able to give some insight into the reasons for excluding the mentioned subject – matter from patenting and the purpose of the prohibition clause.

The EPC work started out in 1959 and was concluded by the adoption of the convention at a diplomatic conference in October 1973. The convention entered into force on 7 October 1977. However, “neither the first draft for a European Patent Convention, which dates from 1962, nor the Strasbourg Patent Convention of 1963 contains any exclusion as to the patentable subject – matter”³¹⁸. Only in 1965, based on a joint German/Dutch proposal, was a list of excluded subject – matter drawn up. This list referred to “scientific knowledge and theories as such, mere discovery of substances occurring in nature, purely aesthetic creations, financial or accounting methods, rules for playing games or other systems, insofar as they are of purely abstract nature, methods of therapy, including diagnostic methods”³¹⁹, to be excluded from patenting. The list was inserted in the draft by the working group preparing the convention. In 1971 following with the emergence of computer technologies the exclusion relating to software was introduced to the draft EPC in January 1971. During the diplomatic conference in 1973 – adopting EPC – Article 52 (3) was inserted into the convention on a German initiative, to the effect that “a broad interpretation should be given to the items not limited in this way in paragraph 2”³²⁰, to the effect that “as such” provision applied to all of the excluded phenomena and not only to “discoveries as such” and “mere presentations of information”.

³¹⁸ Gall, H. G., 1985, Director of Legal Affairs European Patent Office, cited in Hart, R., Holmes, P. and Reid, J., 2000. “The Economic Impact of Patentability of Computer Programs”. [Online] Available at <http://ec.europa.eu/internal_market/indprop/docs/comp/study_en.pdf> [Accessed 7 December 2009].

³¹⁹ Hansen, K. G., 2004. Software Patents in Europe. *Scandinavian Studies in Law*, **47**, pp. 173-201

³²⁰ Government of the Federal Republic of Germany (1973) Munich Diplomatic Conference for the setting up of a European System for the Grant of Patents, 1973. German: Wila-Verlag.

Although it is not possible based on the legislative history to draw conclusions as to the exact scope of the business method exclusion provision and how the “as such” provision relates to it, it is possible to draw the following conclusions: (1) purely abstract nature, methods of therapy should be excluded from patentable subject – matter, and (2) the “as such” – provision has no special bearing on the business methods prohibition, but was introduced to avoid to broad an interpretation of the bans relating to business methods and the other phenomena mentioned in Article 52 (2) of the EPC. Thus, we have reason to believe the real intention of the legislation is if a business method – related invention is beyond the extent of purely abstract nature it could be patentable. In other words only business methods “as such” are excluded from patent – eligible subject matter. Thus, the provision of 52 (3) of the EPC implicates the legislator do not want to exclude all business method – related inventions from patentability. Some business method – related inventions should be granted patent protection. However, the legislature left the legal definition of “as such” open to the interpretation.

3.1.3 Technical character

In the latest revised version of the EPC (EPC 2000), the “as such” provision has clearly defined the scope of the EPC, and explicitly states that patent protection is available to technical inventions of all kinds³²¹. The revised Art. 52 EPC applies to European patents granted and European patent applications pending on 13 December 2007 and to applications filed on or after that date. However, the amendment is unlikely to affect the practice of the EPO, because before EPC 2000 entered into force, the EPO accepted that an invention having a technical character would qualify for a patent protection. This is derived from European

³²¹ See Article 52 (1) of the EPC (2000), which is given in Appendix 2.

Patent Convention Rules 27 and 29, which explain that the description of an invention shall specify the technical field to which the invention relates³²². The revised version of EPC shows that a technical character is now playing a major and decisive role in patentability. For an invention to be patentable, it must be “technical” in some way. In fact, although this technical requirement was not mentioned explicitly in the old version EPC, Article 52 in the old version of EPC has been regarded as a reflection of “technical character” requirement.³²³ The Guidelines for Examination have for some time required an invention to be of “technical character”, and the concept of “technicality” has a major role in patentability. The Guidelines for Examination (2005) state that the examiner should be aware of the following requirement implied in the EPC which is “the invention must be of ‘technical character’ to the extent ... in terms of which the matter for which protection is sought can be defined in the claim”³²⁴. Thus, it is reasonable to believe that in the European patent system, “technical character” is a major criterion used to distinguish patent-eligible subject matter from non-patent-eligible subject matter. In other words, any invention with “technical character” can be regarded as being impossible to fall within the scope of the “as such” prohibition. As a result “technical character” takes a patent application for a business method – related invention outwith the exclusion from patent eligibility. However, just as with the situation of “as such”, there is no formal definition of “technical character” criterion.

To understand the substantial contents of "as such" and "technical character" in the EPC, it is essential to revisit the decisions of the Board of Appeal, which will be analysed in more detail later in this thesis as an important part of the answer for question 1 of the research: which business methods can be granted patent protection under the current legal framework of EPC?

³²² The reason to formulate EPC Rule 27 and 29 at that time is: "although the technical requirement is not mentioned explicitly in the [old version] EPC, article 52 [of the old version EPC] has been regarded as a reflection of this requirement" see EPO (2005) The Guidelines for Examination in EPC, at Part C, Chapter IV, 1.

³²³ European Patent Office (2005) Guidelines for Examination, at Part C, Chapter IV, 1.

³²⁴ European Patent Office, 2005. Guidelines for Examination, at Part C, Chapter IV, 1.2.

3.1.4 The requirements for patentability

After having determined that a contemplated invention constitutes a patent - eligible subject matter, one must then turn to the "true" material requirements for patentability. According to European Patent Convention, the patents have three criteria for patentability: novelty, inventive step and industrial applicability.

3.1.4.1 Industrial Application

Industrial applicability or industrial application is a patentability requirement according to which a patent can only be granted for an invention which is capable of industrial application, i.e. for an invention which is a product that can be made or a process that can be used in some kind of industry (EPC Article 57). The concept of "industry" is far-reaching. It refers not only to manufacturing or heavy machinery, but encompasses any sort of automatic or manual productive effort, e.g., a process for dispersing fog. Thus an invention is also said to have industrial applicability if it is productively useful in areas such as commerce, agriculture, or mining. According to The Guidelines for Examination in the European Patent Office (EPO Guidelines) C-IV 2.2, which provides "it must also be borne in mind that the basic test of whether there is an invention within the meaning of Art. 52 (1) is separate and distinct from the questions whether the subject – matter is susceptible of industrial application, is new and involves an inventive step, an invention susceptible of industrial application does not necessarily have a "technical character". If the claimed subject matter as a whole lacks a "technical character", an objection to it cannot be raised under Article 57 of the Convention

on the Grant of European Patents European Patent Convention (EPC) [industrial application], but should be based instead on Article 52 EPC [patentable inventions]”. The effect of this is that in the absence of technical character, it is not necessary to examine the industrial applicability of the invention which is sought patent protection since it has been rejected on the ground of lacking technical character.

For business method – related inventions, regardless of “technical character”, "there do not appear to be any issues with regards to the industrial applicability of business methods"³²⁵ since business methods always be made or used for certain industries (e.g. financial industry).

3.1.4.2 Novelty

An invention shall be considered to be new if it does not form part of the state of the art (EPC Article 54(1)). In other words, the invention must never have been made public in any way, anywhere in the world, before the date on which an application for a patent is filed³²⁶. This is a novelty requirement for patent application.

“State of the art” is defined very broadly to include any matter that is available anywhere in the world before the priority date of the invention. In practice, the information a patent examiner has or can easily achieve of the current level of knowledge in the field of the invention will be thought as "state of the art". In practice, patent offices have used patent libraries as a reliable indicator of the state of the art.

³²⁵ Ius mentis, 2005. The Patentability of Business Methods at the European Patent Office. [Online] Available at <<http://www.iusmentis.com/patents/businessmethods/epc/>> [Accessed 4 February 2009]

³²⁶ British Library Business & IP Centre (2010). Introduction to Patents. [Online] Available at <<http://www.bl.uk/reshelp/pdfs/Patents.pdf>> [Accessed 8 March 2009]

In contrast with some other patent regimes, applicants for European patents are not provided with a “grace period”³²⁷. Consequently, patents are frequently anticipated and thus rendered invalid for want of novelty as a result of the applicant’s own acts and disclosures.

3.1.4.3 Inventive Step

An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (EPC article 56). The person skilled in the art is simply an unimaginative person with good knowledge and experience of the art within which the invention lies.

The requirement of inventive step is different from the requirement of novelty. Novelty requires that the invention be quantitatively different from what has been disclosed previously; that is, the technical information disclosed by the patent is not already available to the public anywhere in the world. However, inventive step is basically a qualitative examination to ascertain whether the contribution is creative enough to warrant a monopoly.³²⁸ That is to say “inventive step” acts as a measure of the quality of a patent.

Determining where the line is to be drawn between inventions that are non-inventive (obvious) and those that are inventive (or non-obvious) is a difficult task. The EPO has sought to harmonise the approaches of Member States by adopting a “problem- and - solution” approach to obviousness. The approach consists in: (1) identifying the closest prior art, i.e. the most relevant prior art; (2) determining the objective technical problem, i.e.

³²⁷ In some countries, such as the US, Japan, a grace period exists for protecting an inventor or their successor in title from authorised or unauthorised disclosure of the invention before the filing date. That is, if the inventor or the successor in title publishes the invention, an application can still be validly filed which will be considered novel despite the publication, provided that the filing is made during the grace period following publication.

³²⁸ Bently, L., & Sherman, B., 2001. *Intellectual Property Law*. Oxford: Oxford University Press.

determining, in the view of the closest prior art, the technical problem which the claimed invention addresses and successfully solves; and (3) examining whether or not the claimed solution to the objective technical problem is obvious to a skilled person in view of the state of the art in general.³²⁹

In determining the patentability of business method – related inventions, a question is raised by inventive step requirement: who is the “skilled person”? Or to say how to define the “art” in the task of assessing the inventive step for patent – eligible business method inventions? Whether an unimaginative business expert is a skilled person in the task of assessing business method patents? The European Patent Convention does not give an answer. We have to find a solution in the relevant decisions of the EPO Boards of Appeal.

3.2 The cases of EPO Boards of Appeal concerned patenting business methods

3.2.1 Decision in T1002/92 *Queueing System* (1994)

Pettersson, Per Martin, et al were granted a European patent (Patent No. 0 086 199) for a system for determining the queue sequence for serving customers at a plurality of service points. The independent claim described: a single allocation unit for allowing customers to pick the desired service point and for allocating numbers to them, computing means of memorising and managing this information, an information unit for receiving signals indicating the next number to be served at a particular service point, and a terminal at each service point to show who was to be served next. This patent was opposed by Nemo Q AB on

³²⁹ See EPO (2005) The Guidelines for Examination in EPC, at Part C, Chapter IV, 9.8

the grounds mentioned in Article 100(a) EPC (1973)³³⁰, relying in particular on Articles 52 (2) (c) EPC (1973)³³¹ in that the subject-matter of the Claim was a scheme, rule or method for doing business because it merely defined in broad functional terms an apparatus for performing a well known scheme for business automatically organising and controlling a queue sequence), and on Article 54 (2)³³² and 56³³³ EPC (1973) in that considerable parts of the claim lacked novelty with regard to the state of the art as established.

The opposition was rejected by the Opposition Division. The division stated the application was to provide a technical means in the form of an apparatus to assist in organising customer queuing and therefore the patent should be the patent eligible subject matter. "The claimed solution involves **interacting physical structures** (apparatus features) which are **neither simply** the functional realisation of an actual or notional rule for doing business **nor** the hardware realisations of the steps of a computer program."³³⁴ Also, the application was obviously different from the prior art. The Malmo and Sollentuna systems (D5, D6)³³⁵ provided by Nemo Q AB, was held to be different because the Pettersson application handled both customers preselecting a particular service point and customers with no preference for a particular service point. Both were held in a common queue whereas the D5 (the Malmo system) and D6 (the Sollentna system) organised separate parallel queues each for a separate service point.

³³⁰ Article 100 EPC (1973) provides: Opposition may only be filed on the grounds that (a) the subject-matter of the European patent is not patentable within the terms of Article 52 to 57, (b) the European patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, (c) the subject-matter of the European patent extends beyond the content of the application as filed, or, if the patent was granted on a divisional application or on a new application filed in accordance with Article 61, beyond the content of the earlier application as filed.

³³¹ Article 52(2)(c) of the EPC (1973), which is given in Appendix 2.

³³² Article 54 (2) of the EPC (1973), which is given in Appendix 2.

³³³ Article 56 of the EPC (1973), which is given in Appendix 2.

³³⁴ Decision in T1002/92 *Queueing system* (1994) at page 3.

³³⁵ D5: Affidavit of Hans Alm dated 10 September 1984 and descriptive article concerning a prior public use of an automatic queue system constructed by Elcentralen AB, in the Regional Social Insurance Office in Malmo, SE, in 1979. D6: Affidavit of Lars Jander dated 22 December 1982 and descriptive article concerning a prior public use of an automatic queue system constructed by Bela Elektronik in a bank in Sollentuna in 1981.

Nemo Q AB appealed the decision to repel their objection and requested the decision under appeal be set aside and the European patent No. 0 086 1999 be revoked on the ground that: "Though Claim 1 is formulated as an apparatus claim, its subject-matter represents [no more than] a scheme, rule or method for doing business as such within the meaning of Article 52 (2) (c) EPC (1973).. The claimed system is not defined in terms of its physical structure but only in extremely general functional terms which correspond to the steps of such an unpatentable method. Therefore, the claimed system does not contribute anything more to the art than the method itself."³³⁶ Also, the Appellant, Nemo Q AB, argued that the selection unit and the computing means claimed in Claim 1 were also present in the prior art - "Malmö system" and the features in the characterising part of Claim 1 had been indicated by the relevant prior art. Hence, the independent Claim 1 lacked novelty. The respondent contested: "The subject - matter of Claim 1 represents a hardware-like self-consistent physical structure, which has a concrete technical construction with a turn-number allocating and service point selection unit, a computing unit, a terminal at each service point and an information unit. Such a technical realisation of the claimed system forming subject-matter of the claim is by no means a mental rule or method which is only "as such" excluded from patentability by Articles 52 (2) and (3) EPC (1973). The terms used in Claim 1 would give the expert an unambiguous constructional instruction. A general formulation of constructional elements of a three-dimensional system - in particular in terms of their function within the system - is an accepted practice in European and national patent practices and does not transform such constructional elements into non-technical objects."³³⁷ Also, the selection unit and the computing means claimed in Claim 1, which did not exist in the prior art, provided a technical contribution to the art of automatic queueing devices. The novelty requirement was therefore met. The issue of the appeal was: when a business method is conducted by using the characterisation of an apparatus, should

³³⁶ Decision in T1002/92 *Queueing system* (1994) at page 6.

³³⁷ *Ibid.* at page 8 - 9

such an invention be regarded as a business method as such according to Article 52 EPC (1973)³³⁸ and Article 56 EPC (1973)³³⁹.

In the submission of appellant, the Board firstly interpreted the relationship between Articles 52 and 56 EPC (1973). To determine whether an application can be granted patent, “a first question to be considered is whether ... the claimed subject-matter constitutes an "invention" within the meaning of Article 52(1) EPC (1973). If ... such subject-matter is not excluded from being patentable under Article 52 EPC (1973), a further and separate question is whether the claimed subject-matter involves an inventive step [and other requirements of patentability]”³⁴⁰.

The Board of Appeal indicated that the common characteristic of the excluded categories under Article 52(2) and (3) EPC (1973), was that they are essentially is "**abstract in nature**"³⁴¹. Following this description, the Board stated that in the present case the claimed apparatus was clearly technical in nature and has a clear **practical application** to the service of customers. “One such practical application of such apparatus concerns the service of customers ... [the use of] ‘a business equipment’ **does not** mean that the claimed subject-matter **must** be equated with a method of doing business, as such”³⁴². Furthermore, the Board stated that in the case of Pettersson’s patent although the claimed invention used the characterisation of the apparatus indicated in the claims, the use of this apparatus is the user has to exercise. Thus Claim 1 is indeed directed to “an apparatus which comprises, inter alia, computer hardware operating according to a particular computer program”³⁴³. The program-

³³⁸ Article 52 of the EPC (1973), which is given in Appendix 2.

³³⁹ Article 56 of the EPC (1973), which is given in Appendix 2.

³⁴⁰ Decision in T1002/92 *Queueing system* (1994) at page11

³⁴¹ *Ibid.* at page 12

³⁴² *Ibid.* at page 12

³⁴³ *Ibid.* at page 16

determined output signal of the hardware is used for an automatic control of the operation of another system component (the information unit) and thus solves a problem which is completely of a technical nature. The case therefore establishes that a mix of technical and non-technical elements shall not necessarily be excluded from patentability under Article 52 (2) and (3) EPC (1973). For this reason the Board held that claim 1 **as a whole** was an invention within the meaning of Article 52 (1) EPC (1973).

After discussing the patent eligible subject matter, the Board assessed the inventive step of the patent application. The Board first indicated the patent set out to "provide [an] **apparatus means** [a combination with allocation unit, information unit and terminal] which allow to combine the individually service points of the conventional system into a common pool, ... this integration of the independently working terminals of the conventional system into one cooperating pool system necessitates a complete reorganisation of the conventional signal flow, and thus a change from the circuit interconnections of the prior art. ... [also the prior art] does not take into account a customers' preference for a particular barber when he joins the queue and the customer can allow his turn to lapse until the barber of his choice is free, [all of which was presented in the patent under dispute]"³⁴⁴. The existence of a technical contribution demolished the argument of the Appellant which was that the claimed invention lacked an inventive step. On these grounds, the Board judged that the Claim1 could be protected by a patent. The Board granted Claims 2 to 9 which concerned particular embodiments of the system according to Claim 1 and could likewise to be protected. Consequently, the Board dismissed the appeal and approved the patent.

The claimed subject matter in the case was an apparatus (single allocation unit, information

³⁴⁴ Ibid. at page 32

unit, and a terminal) invention in fact and only secondarily concerns business method (organising customer queuing). The significance of the claimed subject matter was that the invention only used the characterisation of the apparatus (collecting, processing and managing information). According to the analysis of the Board in the appeal, the task of assessing whether the claimed subject matter was an invention within the meaning of Article 52 (1) EPC (1973) is a task that should be independently assessed prior to examining the patents' fulfilling of the other requirements of patentability (i.e. industrial applicability, novelty, inventive step). A tangible apparatus is therefore necessarily technical in nature. An invention with such technical features is a patent eligible subject matter. The functional features of the patent (its ability to do a business) should not be considered in this first examination step. Hence, a tangible apparatus to conduct business functions should be regarded as an invention falling within the meaning of Article 52 (1) EPC (1973).

To assess the inventive step of such an invention, involving a mix of technical features and non-technical features, the examination should not be limited to the technical features, but should regard the technical features and the non-technical features as a whole. Therefore, an apparatus invention, which only exercises the characterisation of the apparatus itself, or in other words which lacks an inventive step in its technical features, still could produce an inventive step when it is examined with the non-technical features as a whole. This stepped analysis of compliance with Article 52 (1) EPC, followed by assessment of the other patent requirements was specifically approved by the Board of Appeal. "As a whole" in the case means (1) it must produce an effect (i.e. a problem was solved); (2) the effect was produced by the apparatus or the combination of apparatus (technical features) and method (non-technical features); (3) to produce the effect the apparatus is indispensable (necessary); and (4)

the effect is nonobviousness to a person skilled in the art.³⁴⁵

However, a question raised in the case is to be held who was a person properly skilled in the art? In the appeal, the Board hold that the technical problem was the prior art only so far as enabled an allocation of each service point but the prior art did not contain the ability to take into account a customers' preferences. Yet, the Pettersson invention solved for the first time both of these problems by means of a combination of allocation unit, information unit and terminal (an information processing apparatus in essence). That is why the Board held that it went beyond the prior art in solving queueing problems. The specification of the new invention wrongly emphasised more the business application rather than the enabling information processing system. This could be misleading it inverts its true emphasis. That is to say, that in solving the primary technical aspect to the invention as a technical apparatus. The appropriate person would be skilled in the technical arts. Only secondarily the Board then considered the state of the business field of art and here a businessman would not be expected to know what apparatus could be used to solve the queueing problem. Thus, the decision of the Board seems to enlarge the scope of the skilled person from merely the technical art field to include in addition the business field. That is to say that the appropriate skilled person is one who is a skilled business man who also has the requisite technical knowledge.

Following this decision, we can summarise that any tangible apparatus enabled invention is a patent – eligible invention within the meaning of Article 52 (1) EPC (1973) no matter what business function the apparatus provides, even if it is used for conducting a business method. It follows that any “technical contribution” that the patent makes should be considered in the

³⁴⁵ Ibid. at pages 30-33.

procedure of examining the inventive step. Even if the use of the apparatus is based on the characterisation of the apparatus, if such apparatus together with non-technical features of the innovation as a whole can make a “technical contribution” or solve a “technical problem” wherever the technical apparatus is essential for the achieving of the technical contribution, such an apparatus invention will be patentable if it also fulfills the other patentability requirements and is nonobvious to the appropriate skilled businessman who has the relevant technological knowledge.

3.2.2 Decision T 0769/92 *Sohei* (1995)

The invention in this case concerned a computer implemented business management system, which was called a "general-purpose management system, method for operating said system and transfer slip". As filed the specification explained, that prior to the invention, many computer implemented business management systems had been made. However, these systems had only resulted in systems that were functionally inadequate and difficult to use because businesses required a variety of different management activities to be performed concurrently, each of which was being implemented individually in all the prior art. The invention solved the problem by providing a single user interface for entering data in relation to all the management functions to be performed and by providing processing modules which automatically transferred the data from the user interface into the various files in which they were needed. The combined system thus became easier for users to learn and use because operators only had to learn to use a single interface and, due to the processing modules, the need for multiple entries of the same data into separate modules was avoided. In the application and the decision, this user interface is called the "transfer slip".

On 26 March 1992, the examining division refused the European patent application (patent application No. 86 110 223.4) filed on 24 July 1986. The examiners took the view that the claims were objectionable on the ground that there was no technical contribution to the art, because: (1) the invention's claims **related to** a method of doing business. This objection was raised not only against the method claims but also against the system claims. There was a particular objection to the operator steps set out in the "method of operating ..." claims; (2) the claims **related to** the presentation of information because the novelty was in the provision on screen of a common input slip for different kinds of data; and (3) the claims related **merely** to a computer program. Thus, in accordance with Article 52 EPC (1973)³⁴⁶, the subject-matter of the independent method Claim1 and system Claim2 could not be regarded as an invention within the meaning of Article 52(1) EPC. All of "methods of doing business", "presentation of information" and "computer programmes" are excluded matters where an invention aims to achieve them "as such".

On 18 May 1992, Sohei amended the claims³⁴⁷ and logged an appeal with the Board of Appeal. Against the ground of the examining division's decision, the appellant argued that the invention involved "technicality (by which the applicant submitted that the necessarily technical nature of the invention implied non-exclusion from patentability under Article 52 (2) and (3) EPC (1973) of an invention should, in principle, be examined independently of the question of novelty and inventive step ... Whenever a computerised solution to a problem involves an implementation which is different from how a human being would solve the

³⁴⁶ Article 52 of the EPC (1973), which is given in Appendix 2.

³⁴⁷ The independent amended Claims read as follows: Claim 1: A computer system for plural types of independent management including at least financial and inventory management comprising a display unit, an input unit, a memory unit, an output unit and a digital processing unit ... Claim 2: a method for operating a general-purpose computer management system including a display unit, an input unit, a memory unit, an output unit and a processing unit, for plural types of independent management including at least financial and inventory management comprising the steps of: providing said memory unit for storing a general-purpose management program and data necessary for management..., providing a single transfer slip by displaying it in the form of an image on the screen of ..., automatically entering data successively input through said input unit into the transfer slip, storing said data in accordance with the format of said transfer slip..., updating said data ... transferring said data..., transferring said data..., reading.... See Decision T 0769/92 *Sohei* (1995), at pages 3-5.

problem manually or mentally, technicality in the above sense should be assumed."³⁴⁸ The issue for the appeal was: whether a functional features (management) implemented by software (computer programs) should be excluded from patentability.

In the annex to the summons to the oral proceedings, the Board of Appeal again asserted that the initial subject matter of independent method claim 1 and system claim 2 could not be regarded as an invention within the meaning of Article 52(1) EPC (1973). The Board stated this thus:

"... the claimed invention must be regarded as improving the operator's efficiency by 'combining' separate data input forms intended for different types of management into a single input form allowing the data for all types of management to be entered [simultaneously]. However, since this problem solution is **only** concerned with the operator's activity of inputting data and with the kind of information represented by these data, and since its implementation is purely [by means of] software, the underlying problem would not seem to be a 'technical' one in the sense of requiring structural, e.g. architectural, modifications of the computer.

... It is noted that claim 2 defines a method involving a human being doing business, in which [manual] method paper and pencil have been replaced by a computer. It is agreed that in the parts dealing with the generation of the transfer slip the human being is not involved, but that part still concerns **only** the information content (which may be new) of the transfer slip and not a novel technical process of creating it. This statement would seem to apply to claim 1 as well. In the parts of claim 2 dealing with the use of the transfer slip, the human being is clearly involved."

³⁴⁸ Decision T 0769/92 *Sohei* (1995) at page 5.

Pursuant to the statement of the grounds of appeal, the appellant requested that the decision under appeal be set aside and the patent application be allowed on the basis of amended claims (main or auxiliary request). In response to these observations, the applicants amended the claims to specify that certain steps are performed automatically by deleting the words "of said transfer slip" in the last two lines of Claims 1 and 2 and filed the new claims.

The Board first proceeded to assess whether the application should be excluded from the patentable subject matter, in this the system and method claims should be treated **jointly** without distinguishing any differences based on their different categories. The Board also stated that a mix of computer hardware (i.e. technical feature) and of processing (i.e. functional feature) may or may not be patentable. "If, for instance, a non-patentable (e.g. Mathematical, mental or business) method is implemented by running a program on a general-purpose computer, the fact alone that the computer consists of hardware does not render the method patentable if said hardware is purely conventional and no technical contribution to that (computer) art is made by the implementation. However, if a contribution to that art can be found either in a **technical problem (to be) solved, or in a technical effect to be achieved by the solution**, the mix may not be excluded from patentability under Articles 52(2), (3) EPC". In the appeal, the system was found to be a general-purpose management system, not bounded to any particular type of management function. All the hardware units in the invention were considered conventional. However, as long as the first and second types of management were different, the Board considered the program could be used for any kind of management function. Thus, the claimed system allowed data from several types of management function to be inserted via one user interface. When two kinds of systems, which having different purposes and implying independent activities, were **combined** by a common input device, the items from system will be used in other systems.

Therefore, a solution of technical nature was achieved. "The implementation, in the claimed system and by the claimed method, of the said 'interface' in the form of said 'transfer slip' is not merely an act of programming but rather concerns a stage of activities involving technical considerations to be carried out before programming can start".

Thus, the board considered the implementation in the system of Claim 1 and the method of Claim 2 together to involve technical considerations resulting in a technical contribution to the art within the meaning of the case law with the consequence that in final analysis this system and method were held not to be excluded from patentability. Therefore, the invention as claimed in claims 1 and 2 of the main request fell to be considered as an invention within the meaning of Article 52(1) EPC (1973).

In the appeal, the Board of Appeal agreed that an invention without a technical contribution would not be a patentable subject matter as held by the examining division. However, the Board took a different approach from the examining division in regards to assessing the technical contribution. The examining division had affirmed that the subject matter did not constitute a technical contribution based on the claims (1) included (was primarily set out to achieve) features of excluded matters (a method of doing business, or the presentation of information) under EPC 52(2); (2) related merely to a computer program. The Board decision indicated that the inclusion of the excluded matters under EPC 52(2) did not preclude the invention as a patentable subject matter. Only when the claims **as a whole** concerned **merely** the exclusions under EPC 52 (2), would such an invention be likely to exclude the invention from being a patentable subject matter. Also, **even if** the claims related merely to a matter excluded under EPC 52(2), the invention would still be able to be patented if a technical problem falls to be solved, or if a technical effect achieved the solution to the problem. This

is especially so where an invention comprised functional features (for example doing business) but was implemented by software (the use of computer programs), if technical considerations concerning the particulars of the solution to the problem which the inventions as a whole solved were required in order to carry out the operation of the invention, then the invention will be not excluded from patentability under Article 52 (2) and (3) EPC.

Accordingly, the meaning of the Board of Appeals decision is that an invention which involves an excluded subject-matter or excluded activities "as such" will result in exclusion of an invention where the claims of the invention relate only to the matter excluded under EPC 52 (2) and in addition the invention fails to solve a technical problem or achieve a technical effect. Thus, functional features (for example doing business) implemented by software, although both of these matters are excluded "as such" under EPC 52 (2), would be patent - eligible if the invention solves a technical problem or achieves a technical effect. It should be noted that this opinion was overturned in a later decision³⁴⁹.

3.2.3 Decision T0931/95 *Controlling Pension Benefits System* (2000)

On July 7, 1995 the examining division refused the patent application of Pension Benefit Systems Partnership (European Patent Application No. 88 302 239.4). The reason for the refusal was that the application related to a method for doing business, lacked any technical character and thus was excluded from patentability under Article 52(2) and (3) EPC³⁵⁰. On September 8 1995, Pension Benefit Systems Partnership appealed to the Board of Appeal and requested the reversal of the first-instance decision.

³⁴⁹ This decision is T 0258/03 see section 3.2.5, Chapter Three of the thesis for a detailed description.

³⁵⁰ The Article 52 (2) and (3) of the EPC (1973), which is given in Appendix 2.

The invention in this case is related to a method for effectively managing pension benefits through the use of life insurance, which involved providing a computer with information which had administrative, actuarial and financial characters. Two independent claims were requested in the application: a method claim and an apparatus claim. The question in this case was whether an invention of a purely financial or economic method for operating pension benefits was patentable under EPC Article 52 (Patentable Inventions)³⁵¹, 56 (Inventive Step)³⁵², 84 (The Claims)³⁵³. The appellant argued that a distinction should be made between "doing business" in terms of Article 52 (2) (c) EPC and the present invention, which consisted of a technical tool serving an actuary when doing his job in the industry of business and fund management. Furthermore, it was submitted that the claims were directed to the processing of data which were related to physical entities and thus were not directed to a pension system "as such", so that in the light of Article 52 (3) EPC the exclusion provisions did not apply.

The Board first observed that there is not an explicit requirement for a technical character for an invention under Article 52 EPC or under any other provisions in Part II of the EPC (substantive patent law). Nor did such a requirement occur as a result of the case law of the Boards of Appeal. The Board took into account the frequent use of the term "technical" in the EPC and the Implementing Regulations (which are an integral part of the EPC), and so the Board had to have due regard to the context in which the term "technical" had been used in these sources. The requirement of technical character is inherent to the notion "invention" as it occurs in Article 52 (1). Thus an invention may be an invention within the meaning of

³⁵¹ Article 52 EPC (1973), which is given in Appendix 2.

³⁵² Article 56 EPC (1973), which is given in Appendix 2.

³⁵³ Article 84 EPC provided: "The claims shall define the matter for which protection is sought. They shall be clear and concise and be supported by the description."

Article 52(1) if a technical effect is achieved by the invention or if technical considerations are required to carry out the invention operations. Based on this, the Board considered that if the method is technical or, in other words, has a technical character, it still may be a method for doing business, but would not be regarded as a method for doing business “as such”. Therefore, a method for doing business provided it has a technical character is not excluded from patentability under 52(2) and (3) EPC.

However, in the invention under consideration, claim 1 of the main request was, apart from various computing means mentioned in that claim, directed to a "method for controlling a pension benefits program by administering at least one subscriber employer account". All the features of this claim were steps of processing and producing information having purely administrative, actuarial and/or financial characters. Processing and producing such information are typical steps of business and economic methods. Thus the invention as claimed did not go beyond being a method of doing business as such and, therefore, was excluded from patentability under Article 52 (2) (c) in combination with Article 52 (1) EPC.

The board opined that "a feature of a method which concerns the use of technical means for a purely non-technical purpose and/or for processing purely non-technical information does not necessarily confer a technical character to such a method because "in fact, any activity in the non-technical branches of human culture involves physical entities and uses, to a greater or lesser extent, technical means"³⁵⁴. The Board held that the individual steps in the application defining the claimed method amounted to no more than general forms of data processing intended to achieve the processing of or providing information concerning purely administrative, actuarial and/or financial characters, the purposes of each single step and of

³⁵⁴ Decision T0931/95 *Controlling Pension Benefits System* (2000) at page10.

the method as a whole being a purely economic one.

In the analysis, the Board stated: "Arguments or facts which indicate that the individual steps of the method or the method itself solve any particular technical problem or achieve any technical effect, are not derivable from the patent application and have not been submitted to the board". This statement implies that the board thought that a method invention would be one which used the technical character to solve a particular technical problem or achieve a technical effect. To demonstrate this principle, the board relied on three cases cited by the appellant, which are decisions T 208/84 Computer-related invention/Vicom (the method produced a technical result by applying particular digital image process methods for example for enhancing and restoring images); T 769/92 General purpose management system/SOHEI (which implied a need for technical considerations when carrying out that invention); T 1002/92 Queueing system/PETTERSSON (which is an physical entity invention comprised with three-dimensional apparatus).

For the apparatus claim requested by the appellant, although the Board agreed that an apparatus constituting a physical entity or concrete product suitable for performing or supporting an economic activity, is an invention within the meaning of Article 52 (1) EPC, the board held the "apparatus" so called by appellant was not a real apparatus. "The term 'apparatus' [in the application] may well be understood to refer to an organisational structure. ... Therefore, the claim, when read in isolation, is amenable to be construed as claiming a scheme for doing business only, i.e. as such, which, according to Article 52 (2) (c) and 52(3) EPC should not be regarded as an invention within the meaning of Article 52 (1) EPC."

Regarding the appellant's submissions, "... It is wrong to apply the so-called contribution approach when deciding whether the subject-matter concerned is an invention within the meaning of Article 52 (1)", the Board expressed broad agreement with this and confirmed that the contribution approach is not appropriate for deciding whether something is an invention within the meaning of Article 52 (1) EPC. The Board explained: "There is no basis in the EPC for distinguishing between 'new features' of an invention and features of that invention which are known from the prior art when examining whether the invention concerned may be considered to be an invention within the meaning of Article 52 (1) EPC. Thus there is no basis in the EPC for applying this so-called contribution approach for this purpose."

From the Board's decision, the prior art does not need to be considered in the initial examining step under Article 52 EPC. However, an invention which is operated by means of a method that uses a technical means does not mean that it has a "technical character". Only where it produces a technical effect or solves a technical problem, the method will be considered as having a "technical character". Although the opinion of the Board in this appeal was overturned by the Technical Board of Appeal in a later case³⁵⁵, it is still useful for the arguments relating to business method patents. In the appeal decision, the Board explicitly stated that an apparatus invention constituting a physical entity or concrete product suitable for performing or supporting an economic activity is a physical entity invention essentially and should be regarded as a patent-eligible subject matter.

3.2.4 Decision T 0641/00 *Two identities/COMVIK* (2002)

³⁵⁵ T 0258/03 see section 3.2.5, Chapter Three of this thesis for a detailed description.

This patent (European patent No. 0 579 655) related to digital mobile telephone systems and in particular to the use of a single-user multi-identity IC card as a subscriber identified module in a mobile unit of a GSM-type system, which was granted to Comvik Gsm AB on 5 March 1997. In December 1997, the opponent, DeTeMobil Deutsche Telekom Mobilnet GmbH GIESECKE & DEVRIENT GmbH filed oppositions against the patent on grounds of lack of novelty and lack of inventive step. On April 13 2000, the opposition division in charge of examining the oppositions revoked the patent for lack of inventive step because "multi-identity IC cards were already known from the prior art and that for improving identity selection in digital mobile telephone networks, a skilled person would consider it obvious to use such cards in network systems of the type disclosed"³⁵⁶. The patentee appealed against the revocation decision on 9 June 2000 and submitted two amended versions³⁵⁷ of claim 1 filed as main and auxiliary request in oral proceeding held on 17 January 2002. The relevant legal provisions in the case are the Article 52 (1) - (3) and 56 of the EPC³⁵⁸.

The appellant argued that the prior art relating to GSM telephone systems³⁵⁹ "did not disclose any subscriber identity module or card of the single-subscriber multi-identity type. The multi-service cards known from the prior art were inappropriate for such use in GSM type networks.

³⁵⁶ Decision T 0641/00 *Two identities/COMVIK* (2002) at page 2

³⁵⁷ The two amended versions of claim 1 read as follows: Main request: "1. Method in a digital mobile telephone system of the GSM system of the GSM type, in which subscriber units (MS) are controlled by a subscriber identity module (SIM), characterized in that the subscriber identity module (SIM) is allocated at least two identities (IMSI 1, IMSI 2), information thereon being stored in a home database of the system, said at least two identities being selectively usable, wherein only one identity (IMSI 1 or IMSI2) can be activated at a time, the user when using a subscriber unit (MS) selectively activating the desired identity in said home database from the subscriber unit, wherein the selective activation is used for distributing the costs for service and private calls or among different users". Auxiliary request: "1. Method in a digital mobile telephone system of the GSM type, in which subscriber units (MS) are controlled by a subscriber identity module (SIM), characterized in that the subscriber identity module (SIM) is allocated at least two identities (IMSI 1, IMSI 2), information thereon being stored in a home database of the system, said at least two identities being selectively usable, the user, when using a subscriber unit (MS) selectively activating the desired identity in said home database from the subscriber unit, wherein, when one identity (IMSI 1 or IMSI2) is selectively activated, involving a change of identity, the previous identity is deactivated, controlled by the subscriber's home database (HLR), an incoming call being set up against the activated identity controlled by the information in the home database, the selective activation being used by the home database for distributing the costs for service and private calls or among different users."

³⁵⁸ The Article 52 (1) - (3) of the EPC (1973) is given in Appendix 2.

³⁵⁹ The relevant prior art cited by the opponent as an evidence against the patent was: "The Subscriber Identity Module for the European Digital Cellular System GSM", a paper of G. Mazziotto, which was published in Fourth Nordic Seminar on Digital Mobile Radio Communications DMR IV, 26 to 28 June 1990, Oslo, Norway.

Furthermore, without modifying the network's home database in the manner envisaged in the present invention, the necessary functionality of the system could not be provided"³⁶⁰. The respondents opposed the appellant's submissions and argued that "allocating two or more identities to the same subscriber for the purpose of distributing the costs for service and private calls or among different users was an issue of GSM commercial and administrative management rather than a technical feature of the telephone network or its infrastructure. Commercial and administrative ideas and concepts, however, have no technical character and did thus neither confer novelty nor inventive step to any subject - matter; such a kind of definition rather obscures technical aspects in an invention".

The issue argued in the case was how to assess an invention consisting of a mixture of technical and non-technical features and having technical character as a whole with respect to the requirement of inventive step within the Article 56 EPC, which states that an invention shall be considered to involve an inventive step, if, having regard to the state of the art, it is not obvious to a person skilled in the art.

The Board considered the legal definition of Article 56 EPC is to be put into context with the remaining patentability requirements of Articles 52 to 57 EPC, these articles implying that the general principle is that patents shall be available for inventions in all fields of technology, and that **technical character** is a sine qua non for an invention in the sense required by the EPC.

The Board stated in T 26/86 X-ray apparatus/KOCH& STERZEL, (OJ EPO 1988, 19) a mix

³⁶⁰ Decision T 0641/00 *Two identities/COMVIK* (2002) at page 4.

of technical and non-technical features was considered as a matter of principle to be patentable even if the technical part was not the dominating part of the invention. Also the **technical part of the invention will be considered as the basis for assessing the inventive step**, whereas features making no such contribution cannot support the presence of inventive step. Thus, because the claimed subject matter is legitimate and has a mix of technical and non-technical feature, even if the non-technical features form a dominating part of the invention, it still would be considered as a patentable matter.

In the appeal decision, the Board developed and applied a method known as the "**problem-and-solution approach**" as a test for whether an invention meets the inventive step requirement within Article 56 EPC. The "problem/solution approach" comprises the following steps:

- (1) an "identification of the technical field of the invention (which will also be the field of expertise of the person skilled in the art to be considered for the purpose of assessing inventive step),"
- (2) an "identification of the closest prior art in this field",
- (3) an "identification of the technical problem which can be regarded as solved in relation to this closest prior art, and
- (4) an "assessment of whether or not the technical feature(s) which alone or together form the solution claimed, could be derived as a whole by the skilled person in that field in an obvious manner from the state of the art".

In applying this approach, the problem must be a technical problem, it must actually be solved by the solution claimed, **all** the features in the claim should contribute to the solution, and the problem must be one that the skilled person in the particular technical field might be

asked to solve at the priority date.

The Board defined "the skilled person" as a businessman with the acknowledgement in the relevant technical field. If the technical problem is concerned with a computer implementation of a business, actuarial or accountancy system, **the skilled person** will be someone skilled in data processing, and not merely a businessman, actuary or accountant.

Based on this approach, the Board stated that the technical character of the claimed invention in the appeal was a way of charging costs. However, when the closest prior art, which describes features of the GSM network standards at the stage of implementation reached in 1990 and the so-called Subscriber Identity Module SIM in particular³⁶¹, the Board found that "the patent in suit does not disclose or claim any new way of charging costs, but only correlates more than one identity with one and the same subscription under the discrimination aspect"³⁶². Thus, the Board held that the claimed invention did "not involve any technical ingenuity and hence cannot contribute positively to the inventive step"³⁶³.

Although the invention in suit was rejected by the Board, the reasoning of the Board gave a direction as to how to assess the requirement of inventive step for an invention involving a mix of technical and non-technical features, which would be principally considered as a patentable matter, the basis for the examining involves the technical part of the invention.

³⁶¹ The closest prior art was: "The Subscriber Identity Module for the European Digital Cellular System GSM", a paper of G. Mazziotto, which was published in Fourth Nordic Seminar on Digital Mobile Radio Communications DMR IV, 26 to 28 June 1990, Oslo, Norway

³⁶² Decision T 0641/00 *Two identities/COMVIK* (2002) at page 13

³⁶³ Decision T 0641/00 *Two identities/COMVIK* (2002) at page 13

That is the “problem – and – solution approach” is an important test, although it is not the exclusive test, in the process of assessing the requirement for an inventive step for a mix of technical and non-technical features. If all the features (technical features and non-technical features) of the invention contribute to the solution and it solves a technical problem, and the solution is nonobvious to the skilled person, then the invention will be regarded as meeting the inventive step requirements provided by Article 56 EPC. The skilled person should have sufficient knowledge of both the technical field and the non-technical field related to the claims.

3.2.5 Decision T 0258/03 *Auction method/Hitachi* (2004)

This case concerned an activity for performing a “Dutch” auction in the absence of bidders in which a server (implementing the method) applied a business scheme (amounting to the rules of an auction) and performed any necessary calculation. The examining division refused the patent application (European patent application No. 97 306 722.6) filed by Hitachi Ltd. The reasons held by examining division were: "Claim 1, ..., an auction method, was a business method as such, which cannot be regarded as an invention pursuant to Article 52 (2) and (3) EPC. Also although claim 2 is an apparatus claim, the claim was still excluded from patentability because it defined the subject-matter with a scope of protection equivalent to that of the method claim, and it would be formalistic to make a distinction in this respect between claims of different categories"³⁶⁴. The Division also stated that even if the claimed subject-matter were an invention within the meaning of Article 52 (1) EPC, it did not involve an inventive step as required by Article 56 EPC. Thus, Hitachi filed new sets of claims and appealed to the Board. In the requests 1 to 3 of the new sets of claims, each request contained

³⁶⁴ Decision T 0258/03 *Auction method/Hitachi* (2004) at page 1.

claims for an auction method, an auction apparatus and a computer program to carry out the method³⁶⁵. Corresponding auxiliary requests 4 to 7 were for the respective apparatus claim only. Based on the amended claims, the appellant argued that the claimed invention was an apparatus invention, an automated system to operate on a network. "An apparatus might be patentable even if it processed business - related information, a corresponding method involving technical features could not be excluded from patentability under Article 52 (2) EPC"³⁶⁶. Also, as to the issue of the inventive step, the auction principles involved in the claimed invention was new and solved a technical problem. "When performed in the proposed way an auction could be held without the participants having to give bids on-line which solved the technical problem known from the prior art of lacking synchronisation and different delays within the network used by the bidders. The solution was technical since it required new data to be input to the computer".³⁶⁷ The issue in this case is how to understand the "technical" requirement in the different steps of examining the patentability of the invention. The relevant legal provisions included Article 52 (1) (2) (3). 54, 56 and 57 of the EPC (1973)³⁶⁸.

The appellant argued that the automatic auction method of claim 1 required an automated system to operate on a network which meant that a technical feature was involved. Also,

³⁶⁵ Claim 1 reads: "An automatic auction method executed in a server computer comprising the steps of a) Transmitting information on a product to be auctioned to a plurality of client computers via a network, each client computer belonging to a bidder; b)receiving a plurality of auction ordering information pieces, each including a desired price and a maximum price in competitive state, for purchase of said product, from the plurality of client computers via the network; c) storing the received auction ordering information pieces in the server computer for respective bidders; d)setting an auction price; e)determining whether there is any bidder who proposes a desired price equal to or higher than the auction price using the auction ordering information pieces stored in the server computer; f)..." Claim 3 is for a "computerized auction apparatus for performing an automatic auction via a network, among a plurality of bidders, the bidders using a corresponding plurality of client computers", the apparatus comprising means for performing the steps set out in claim 1. Claim 2 of the first auxiliary request is directed to an auction apparatus additionally comprising means for receiving and storing "an amount condition" and "a product quantity status" in order to determine whether "any of the plurality of products remain", in which case the auction continues. Claim 2 of the second auxiliary request is directed to an auction apparatus which, in addition to the apparatus of the preceding request, uses "rules" for determining the successful bidder. Claim 2 of the third auxiliary request is directed to an auction apparatus additionally comprising "means for receiving a bidder identifier" and a "password" in order to "authenticate each bidder using the received identifier and password". See Decision T 0258/03 Auction method/Hitachi (2004) at page 2

³⁶⁶ Ibid.

³⁶⁷ Ibid.

³⁶⁸ The Articles 52 (1) (2) (3), 54, 56, 57 of the EPC (1973) are given in Appendix 2.

since the decision T 0931/95³⁶⁹, the Board has held that a case under Article 52 EPC should be judged without reference to the prior art, it need not be necessary that the hardware components of the claim were new for the method to possess technical character. Thus, "since an apparatus might be patentable even if it processed business - related information, a corresponding method involving technical features could not be excluded from patentability under Article 52 (2) EPC"³⁷⁰. As to the issue of inventive step, the appellant argued that the invention did not represent the mere automation of a known auction method since the auction principles were new. To perform the new auction the invention solved a technical problem, which were that the prior art lacked synchronisation as different delays within the network used by the bidders, required new data to be input to the computer.

The Board stated that a claimed subject matter which can be granted European patent must fulfil four requirements: (1) it is the invention within the meaning of Article 52; (2) The invention must be new; (3) the invention must involve an inventive step; and (4) the invention must be industrially applicable.

An invention within the meaning of Article 52 implies that the subject matter has technical character. In the decision the board held that the approach used in assessing the technical character requirement, the so-called contribution approach applied in the earlier jurisprudence of the Boards of Appeal, that "the invention involves some contribution to the art in a field not excluded from patentability", is **inappropriate** according to the more recent decisions of the Boards. Furthermore, in accordance with Article 52(3) EPC, the subject-matter mentioned in paragraph 2 of the same article is only excluded from patentability *as such*. Hence, "a mix of technical and non-technical features may be regarded as an invention within the meaning

³⁶⁹ See section 3.2.3 in this chapter of this thesis for a detailed description.

³⁷⁰ Decision T 0258/03 *Auction method/Hitachi* (2004) at page 4-5

of Article 52(1) EPC, and that prior art should not be considered when deciding whether a claimed subject-matter is such an invention". Thus an invention involving mixed technical and non-technical features will be regarded as an invention within the meaning of Article 52(1) EPC because of the existence of technical features. Based on this, the Board stated that the apparatus of claim 3 is an invention within the meaning of Article 52 (1) EPC since it comprised clearly technical features (server computer, client computers and network).

Deciding that the contribution approach is not available to assess the "invention" requirement, the Board explicitly expressed their opposition to the opinion in decision T0931/95 which states that; "A feature of a method which concerns the use of technical means for a purely non-technical purpose and/or for processing purely non-technical information does not necessarily confer a technical character to such a method". In the Board's opinion, any practical answer to the question, whether a technical character is conferred to a method using technical means for a purely non-technical purpose, would have to rely on some weighting of the importance of the features to determine the "core" of the invention, necessarily including considerations of their technical relevance, in particular their possible novel or inventive contributions, with respect to the prior art. The Board, therefore, held that "the notion of a non-invention 'as such' would typically represent purely abstract concepts devoid of any technical implications". The Board concluded: "in general, a method involving technical means is an invention within the meaning of article 52 (1) EPC".

As a result the Board held that the apparatus of claim 3 was a patentable invention since it comprises clearly technical features such as a "server computer", "client computers" and a "network". And also the method of claim 1 was not excluded from patentability under Article 52 (2) EPC because a method involving a technical means is an invention within the meaning

of article 52 (1) EPC.

In assessing the requirement for an inventive step for the claimed invention, the Board agreed that the step should take account of only those features which contribute to a technical character, as were set out in decision T0641/00³⁷¹. Thus, the features that make a technical contribution therefore need to be determined in the initial step. However, in the appeal the technical part of the invention was limited to instructing the server computer to apply given conditions and perform any necessary calculations. Hence, the aim of the claims is to circumvent a technical problem rather than solving it by a technical means which would be obvious to the person skilled in the art of data processing. The application did not involve an inventive step and could therefore not be patented.

In the appeal, the Board created a principle to be used to determine whether the claimed subject matter brings the invention within the meaning of Article 52 (1) EPC, which is that anything (involving a purely abstract concept) involving a technical means is an invention within the meaning of article 52 (1) EPC. Thus, whether the claimed invention solves a particular problem or achieves a technical effect is not essential in assessing whether it is excluded from being a patent eligible subject matter within the meaning of Article 52 EPC. An apparatus invention or a method invention involving a technical means is a patent eligible subject matter under the meaning of Article 52 EPC. The consideration of the prior art should be conducted only in the step of examining the requirements of novelty and inventive step. Also the examination of inventive step should be confined to the features which contribute to a technical character.

³⁷¹ See Section 3.2.4 in this chapter of the thesis for a detailed description.

3.2.6 Decision T 0154/04 *Estimating sales activity* / *DUNS LICENSING ASSOCIATES*

(2006)

The claimed subject matter (European patent application No. 94 912 949.8) concerned an invention related to the estimation of sales activities at non-reporting sales outlets. The examining division refused the application for the reason that the claimed subject matter did not go beyond being a method of doing business as such which is excluded from patentability under Article 52 (2) in combination with Article 52 (3) EPC. In addition, an objection was raised that the subject matter of claim 1 did not involve an inventive step when considering the prior art. The applicant lodged an appeal against the decision of the examining division. Although the appeal was dismissed on the ground of the procedure provision (15 & 16 RPBA, Art. 112 EPC 1973) by the EPO's Technical Board of Appeal, the decision of the Board still is helpful to understand the thinking of the Board in regard to business method patents. In the appeal, the appellant argued that: "the technical contribution made by the invention is the advance over that which was already known before the priority date ... The exclusions were separate provisions and should be considered separately. ... The advance [of the present invention] was a better estimation of total sales activity, which was technical. The invention provided a better processing of data, which represented physical entities. ... The fact is it was a technical tool". The issue for the decision was how to examine whether a subject matter is patentable.

In the decision, the Board first summarized the principles used to deal with the patent

application:

“(A) Article 52 (1) EPC sets out four requirements to be fulfilled by a patentable invention: there must be an invention, and if there is an invention, it must satisfy the requirements of novelty, inventive step, and industrial applicability.

(B) Having technical character is an implicit requisite of an "invention" within the meaning of Article 52 (1) EPC (requirement of "technicality").

(C) Article 52 (2) EPC does not exclude from patentability any subject matter or activity having technical character, even if it is related to the items listed in this provision since these items are only excluded "as such" (Article 52 (3) EPC).

(D) The four requirements invention, novelty, inventive step, and susceptibility of industrial application are essentially separate and independent criteria of patentability, which may give rise to concurrent objections. Novelty, in particular, is not a requisite of an invention within the meaning of Article 52 (1) EPC, but a separate requirement of patentability.

(E) For examining patentability of an invention in respect of a claim, the claim must be construed to determine the technical features of the invention, i.e. the features which contribute to the technical character of the invention.

(F) It is legitimate to have a mix of technical and "non-technical" features appearing in a claim, in which the non-technical features may even form a dominating part of the claimed subject matter. Novelty and inventive step, however, can be based only on technical features, which thus have to be clearly defined in the claim. Non-technical features, to the extent that they do not interact with the technical subject matter of the claim for solving a technical problem, i.e. non-technical features "as such", do not provide a technical contribution to the prior art and are thus ignored in assessing novelty and inventive step.

(G) For the purpose of the problem-and-solution approach, the problem must be a

technical problem which the skilled person in the particular technical field might be asked to solve at the relevant priority date. The technical problem may be formulated using an aim to be achieved in a non-technical field, and which is thus not part of the technical contribution provided by the invention to the prior art. This may be done in particular to define a constraint that has to be met (even if the aim stems from an *a posteriori* knowledge of the invention).”

The board then explained these principles in detail. The board analysed the relevance of Article 52 (1), Article 52 (2) and Article 52 (3) EPC in defining the patentable invention. The Board stated Article 52 (1) EPC expresses the fundamental maxim of the general entitlement to patent protection for any inventions in all technical fields. Any limitation to the general entitlement to patent protection is thus not a matter of judicial discretion, but must have a clear legal basis in the European Patent Convention, which is ruled by EPC 52 (2). However, the list of excluded subject matters under EPC 52 (2) should not be given too broad scope of application and should be restricted to such subject matters "as such" presented in EPC 52 (3). The bar to Article 52 (2) EPC, introduced by paragraph 3 of the present Article, involving the listing of items in Article 52 (2) EPC, whose common feature is a substantial lack of technical character, is to express the exclusion criterion of a patent eligible subject matter through sampling. Hence, "having technical character, any product, method etc., even if formally relating to the list enumerated in paragraph 2, is not excluded from patentability under paragraphs 2 and 3 of Article 52 EPC".

The Board further indicated that the presence of technical character in an invention (as well as for the industrial applicability) does not imply any new contribution to the prior art. Hence, the Board abandoned the "technical effect approach" (also called "contribution approach"),

which the boards did some ten years ago, to justify whether the claimed subject matter is an invention within the meaning of Article 52 (1) and (2) EPC, because the approach referred to the prior art and is now acknowledged as irreconcilable with the purposes of the European Patent Convention. The Board stated: "Actually, any reference to the prior art in the context of Article 52 (2) and (3) EPC would lead to insurmountable difficulties; the prior art, the "state of the art" in the terminology of the Convention, is a complex concept finely tuned by a combination of provisions, Articles 54 to 56 EPC, ... However, no rule whatsoever defining the prior art should be applied in the context of Article 52 (2) EPC."

The Board also distinguished "technical feature" and "technical character" and stated that a non-technical feature may produce a technical effect, which should count as contributing to a technical character. "In fact, a non-technical feature may interact with technical elements so as to produce a technical effect." Thus, some purely excluded matters could be a patentable invention. However, an invention, to be granted patent protection, "must provide a novel and inventive technical contribution to the prior art ... as well as industrial applicability."

The Board stated that "whereas novelty is not necessary to establish the technical character of an invention, the converse is not true as novelty and inventive step can only be established on the basis of the technical features of the invention". To demonstrate the point, the Board cited a statement in decision G2/88 which held that "A claimed invention lacks novelty unless it includes **at least one** essential technical feature which distinguishes it from the state of the art. ... if on its proper construction the claim contains no technical feature which reflects such new use, and the wording of the claim which refers to such new use is merely mental in nature and does not define a technical feature, the claim contains no novel technical feature and is invalid under Article 54(1) and (2) EPC". Thus, when assessing the novelty and

inventive step for a mix of technical features and non-technical features, the non-technical features could be ignored in these two steps. However, the Board stressed that ignoring these features must only be "to the extent that they [the non-technical features] do not interact with technical features to produce a technical effect".

When examining the requirement of inventive step for a patent application, the Board insisted that the problem-and-solution approach should be adopted as a test. In this approach the Board restated that the problem must be a technical problem. However, the board indicated that defining the technical problem may need to refer to the non-technical part of the invention because "[if not], defining the problem will generally result either in an unintelligible vestigial definition, or in a contrived statement that does not adequately reflect the real technical contribution provided to the prior art."

After analysis of the principles as to the patenting of an invention under the EPC legal framework, the Board took a step back and analysed the claimed subject matter in the application under consideration. The Board stated that the independent claim 1 of the application in the suit was a method to create information about sales activities or other types of business data using mathematical and statistical methods to evaluate data gathered from the respective business environments. This was a business research activity and like other research methods did not serve to solve a technical problem relevant to any technical field. Therefore, as a method of doing business/business research "as such", it was excluded from patentability under Article 52 (2) (c) and (3) EPC.

The decision elaborated that the EPC Article 52 , 54, and 56, which state the requirements of patentability had a great significance to patenting business methods and other excluded

subject matters listed in Article 52 (2) EPC. According to the decision, we can summarize the finding as follows: (1) whether the claimed subject matter is an invention falling under the meaning of Article 52 is a matter prerequisite to examining the patentability of the patent application; (2) an invention falling under the meaning of Article 52 is any subject matter or activity having a technical character; (3) when examining the requirement of novelty and inventive step, the first step is to find out the features which contribute to the technical character of the invention, which is the basis to examine these two requirements (Novelty and inventive step). However, the appeal decision different from the previous decision (which is T0641/00 Two identities/COMVIK) which held that all the features in the claims, including technical features and non-technical features, must contribute to the solution that solve the technical problem, in that the appeal decision of the board stated that when the claims involve mixed technical characters and non-technical characters, it is not essential that the non-technical character contributes a technical effect. If, and to the extent that, the non-technical features do not interact with technical features to produce a technical effect, it was not necessary to examine the novelty and inventive step for the non-technical features; (4) when the "problem-solution approach" is applied to decide whether an invention involves an inventive step, defining the technical problem may need to refer to the non-technical part of the invention.

3.3 Summary

According to the EPC Article 52, 54, 56 and 57, an invention is patentable if it can meet the following four criteria: (1) it is an invention under the meaning of Article 52 (1) EPC, and is not an excluded subject matter listed in Article 52 (2) EPC "as such" (Article 52 (3) EPC); (2) it is capable of industrial application (Article 57 EPC); (3) it is novel (Article 54 EPC); and (4)

it involves an inventive step (Article 56 EPC). These four criteria are separate and independent (Decision T 1002/92, T 0154/04) and must be decided in separate and independent stages.

Whether a patentable invention is a patent-eligible invention, i.e., whether it is an invention under the meaning of Article 52 (1) EPC and is not the excluded subject matter listed in Article 52 (2) EPC "as such", is a prerequisite in the four steps (Decision T 1002/92, T 0154/04). According to decision T 1002/92, T 0931/95, T 0641/00, T 0258/03, as well as T 0154/04, a patent-eligible invention is an invention having a technical character. Anything having a technical character is an invention under the meaning of article 52 (1) EPC, even if it is merely an excluded subject matter which is listed in the Article 52 (2) EPC (Decision T 0769/92, T 0931/95, T 0154/04). The term "as such" therefore means "without technical character". In this first step, the claims should be treated jointly without distinguishing any differences based on their different categories (Decision T 0769/92). Thus when an invention involves a tangible apparatus (or to say a physical entity) (Decision T1002/92, T 0258/03), which is clearly technical in nature, even if the technical part was not the dominating part of the invention (Decision T 0641/00), as a whole the invention will be a patent eligible subject matter. The question, whether there is a technical contribution, should not be considered when determining whether the claimed subject matter is patent eligible (Decision T 0258/03). For a pure business method invention or a mix invention of pure business method and other excluded subject matters listed in Article 52 (2) (e.g. a computer programme), if the invention has a technical character, it will be not excluded from patentability under Article 52 (2) and (3) EPC, where the technical character just is a technical effect achieved by the invention or a technical means involved in the invention rather than a technical contribution to the art because prior art should only be considered in examining the requirements of novelty and

inventive step (Decision T 0258/03).

If the claimed subject matter constitutes a patent-eligible invention, the further and separate questions are whether it has novelty, inventive step and industrial applicability (Decision T 1002/92, T 0154/04). For examining the requirement of novelty and inventive step, the features which contribute to the technical character of the invention must be ascertained firstly in order to identify the closest/ relevant prior art. In this process, the decision will consider all technical features and non-technical features (Decision T 0154/04). Only to the extent that non-technical features do not interact with technical features to produce a technical effect, will the non-technical features be ignored in these steps (Decision T 0154/04).

To date, the "problem - and - solution approach" is a valid and useful test to determine whether an invention meets the inventive step requirement under Article 56 EPC. When applying this approach to an invention related to a business method, it is necessary to define the technical problem and so it is necessary also to refer not only to the technical part of the invention but also to the non-technical part of the invention (Decision T 0154/04). This means that an invention which combines tangible apparatus with a business method (or a mix of a pure business method and other excluded subject matters listed in Article 52(2) EPC, e.g. Software), even if the tangible apparatus does not contribute a technical solution, or where the invention only exercises the characterisation of the tangible apparatus itself, or when the invention as a whole solves a technical problem (a technical contribution), thus still can produce an inventive step, if the effect was produced on the necessary use of the characterisation of the tangible apparatus (Decision T1002/92).

The "skilled person" referred to in determining the inventive step requirement should be an expert in the technical field with the requisite acknowledgement of the non-technical field also (Decision T 0641/00).

Based on this summary, the examining process for determining the patentability of a business method - related invention should be constituted by following the steps shown in table 1: steps for examining business method - related invention in EPO (included at the end of this chapter). The steps are as follows:

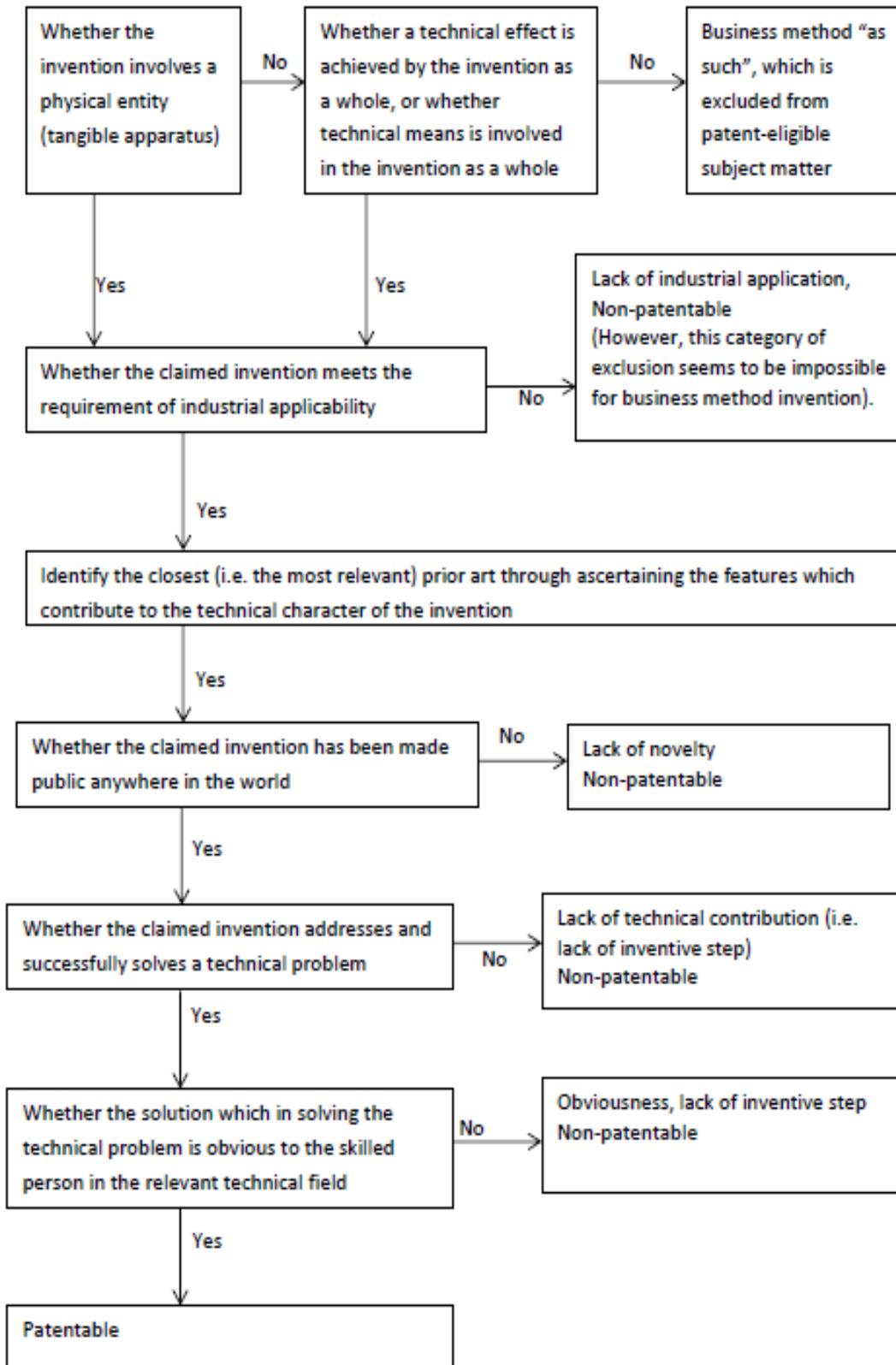
The first step is to determine whether the claimed invention involves a tangible apparatus(es) or physical entity(ies). If not, the following step is to assess whether the invention achieves a technical effect or whether it uses a technical means. If the answer is still "no", then the invention will be regarded as a business method "as such" and be excluded from patent-eligible subject matter because it lacks any technical character. If the invention involves a (one or more) tangible apparatus(es) / physical entity(ies), or although it does not involve any tangible apparatus / physical entity the business method itself (or a mix of business method and other listed excluded subject matter in 52 (2) EPC, e.g. computer programme) interacts with technical element(s) and produces a technical effect, the invention will be regarded as an invention within the meaning of Article 52(1) EPC and will now pass on to the following examining steps.

The next step is to assess the industrial applicability requirement for the claimed invention. However, for business methods there do not appear to be any issues with regards to the industrial applicability of business methods. That is to say, that a business method invention seems necessarily to have industrial applicability. It follows that this step will be ignored in

relation to a patent application for a business method - related invention.

Before starting the examining process for the requirements of novelty and inventive step, the features which contribute to the technical character of the invention should be ascertained firstly in order to identify the closest / relevant prior art. Then the prior art which is identified is used to determine the novelty of the invention. If the invention has been made public in the prior art, the application will be rejected on the ground of lack of novelty. If the invention is novel, then the next step is to assess whether the invention involves an inventive step. A useful test in this step is the so-called “problem-and-solution approach”. Based on the closest / relevant prior art, the objective technical problem will be determined. If the objective technical problem cannot be found, i.e. the claimed invention does not address and successfully solve at least one technical problem, then the claimed invention will be unpatentable because it does not have any technical contribution and cannot meet the inventive step requirement. When the objective technical problem is determined, the approach is then to examine whether the claimed invention as a whole is obvious to a skilled person given the state of the art in general. When the claimed invention is nonobvious for the skilled person in the relevant technical field, it will be granted a patent.

Table 1: steps for examining business method - related invention in EPO



Chapter Four: Business Method Patents in the U.S.

This chapter summarizes the judicial history of business method patents in the US and provides an in-depth analysis of litigation practice. As a backdrop to that analysis, we provide an overview of the US patentable requirements.

4.1 Patentability

4.1.1 Statutory subject matter

Title 35 of the United States Code (35 U.S.C.) is a title of United States Code regarding patent law. The sections of this title govern all aspects of patent law in the United States. The Section 101 of 35 U.S.C. defined the categories of statutory patent – eligible subject matter, which provides that: “whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title”, which defines four categories of inventions that are patent eligible subject matter: "process", "machine", "manufacture", or "composition of matter". Those four categories exhaust the possible things for which a patent may be obtained. Patent professionals, however, tend to regard the basic categories of invention as two: process inventions and product inventions.

A "process" can be defined as a means to an end. The remaining three categories (machine, manufacture, or composition of matter) can be defined as ends in themselves - "products". Thus, there are, essentially, only two categories of patentable subject matter: processes and products. Products are physical entities – “machines” are perhaps the most obvious of the

three. “Manufactures” are any fabricated products that otherwise satisfy the requirements of patentability. Finally, a “composition of matter” describes what most people imagine to be the goal of the typical laboratory inventor.

In Diamond v. Chakrabarty (1980)³⁷², the Supreme Court first stated that a patentable subject matter is "anything under the sun made by man". In this case, the respondent filed a patent application relating to his invention of a human-made, genetically engineered bacterium capable of breaking down crude oil, a property which is possessed by no naturally occurring bacteria. The patent examiner's rejection of the patent application's claims for the new bacteria was affirmed by the Patent Office Board of Appeals on the ground that living things are not patentable subject matter under 35 U.S.C Section 101 (i.e., not a “process, machine, manufacture or composition of matter”). The court reversed the rejection and held that living organisms could be considered patentable subject matter because the Congress intended §101 to extend to "anything under the sun made by man"³⁷³. Similar interpretations also are stated in Diamond v. Diehr (1981)³⁷⁴ and State Street Bank and Trust Co. V. Signature Fin. Group, Inc. (1998)^{375 376}.

The Manual of Patent Examining Procedure (MPEP) published by the United States Patent and Trade Office (USPTO) interpreted section 101 of the 35 U.S.C. in 2010, and stated "the latter three categories define 'things' or 'products' while the first category defines 'actions' (i.e., inventions that consist of a series of steps or acts to be performed)³⁷⁷. The term "any" in this

³⁷² *Diamond v. Chakrabarty*, 447 U.S. 303 (1980)

³⁷³ *Ibid.* at 309

³⁷⁴ *Diamond v. Diehr*, 450 U.S. 175 (1981)

³⁷⁵ *State Street Bank and Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (1998)

³⁷⁶ In both cases the court stated the 1952 Act "inform[s] us that Congress intended statutory subject matter to include anything under the sun that is made by man".

³⁷⁷ MPEP 2106 (IV) (A)

section³⁷⁸ has been interpreted by U.S. Court of Appeals for the Federal Circuit (CAFC)³⁷⁹ in In re Alappat (1994)³⁸⁰, as that "Congress's intent [was] not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in section 101 and the other parts of Title 35"³⁸¹. After reviewing the decision of the Court of Appeals for the Federal Court, the MPEP (2010) gave a complete definition of the scope of statutory subject matter, reflecting Congressional intent, to the effect that "any new and useful process, machine, manufacture or composition of matter under the sun that is made by man"³⁸².

4.1.2 Exceptions to Patentable Subject Matter

Before we discuss the exceptions to patentable subject matter, it must be stressed that the U.S. Patent Law does not include statutory exceptions to patentability. This is because the U.S. Patent statutes the law details what is patentable rather than listing what is not.

The only exceptions³⁸³ to patentability are created judicially, although the courts have recognized that "Courts should not read into the patent laws limitations and conditions which the legislature has not expressed"³⁸⁴. After reviewing the broad language of the statutes, the Supreme Court has identified three categories of non-patentable subject matter: abstract ideas,

³⁷⁸ Section 101 of the 35 U.S.C., which is given in Appendix 1.

³⁷⁹ The United States Court of Appeals for the Federal Circuit (Federal Circuit; in case citations, Fed. Cir. or C.A.F.C.), is a United States Court of Appeal, which was created by US congress with passage of the Federal Courts Improvement Act of 1982. The Court merged the United States Court of Customs and Patent Appeals and the appellate division of the United States Court of Claims. One of its exclusive jurisdictions is to hear appeals from United States Board of Patent Appeals and Interferences or any of the United States district courts where the original action included a complaint arising under the patent laws.

³⁸⁰ *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994)

³⁸¹ *In re Alappat*, 33 F. 3d. 1526 (Fed. Cir. 1994) at 1542

³⁸² MPEP 2106 (IV) (A)

³⁸³ Mathematical algorithms also were originally thought to belong to the non-patentable subject matter. In the *Gottchalk v. Benson* the Court recognized that mathematical algorithms are not patentable to the extent that they are mere abstract ideas. However, practical applications of these ideas may be patentable. (See *Gottchalk v. Benson* 409 U.S.63 (1972)). Almost a decade after the *Benson* decision, in the *Diamond v. Diehr* case the court held that when the algorithm was incorporated in a useful process, curing rubber, the subject matter was statutory. In reaching that conclusion, the Court treated mathematics like any other basic principle: while a basic principle is not patentable, a new and useful structure created with the aid of that principle is, (see *Diamond v. Diehr* 450 U.S.175 (1981))

³⁸⁴ *Diamond v. Chakrabarty* 447 U.S. 303 (1980). See also *Diamond v. Diehr* 450 U.S. 175 (1981).

laws of nature and natural phenomena³⁸⁵. The court explained the reasoning behind these limitations:

“[A] new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity. Such discoveries are ‘manifestations of ... nature, free to all men and reserved exclusively to none’.”³⁸⁶

This is not to say that any invention, which involves “abstract ideas, laws of nature and natural phenomena”, is an exception to patentable subject matter. Court practice has provided a proposed ground of challenge that where an applicant is seeking to patent an abstract idea, a law of nature or a natural phenomenon, which is that a practical application or use of an idea, a law of nature or a natural phenomenon is patent – eligible subject matter.³⁸⁷ MPEP 2106 (IV) (A) provides that: “[only] the subject matter that is not practical application or use of an idea, a law of nature or a natural phenomenon is not patentable”.

Eligibility problems within these contents have elicited much debate and case law in practice, regarding the patentability of business method inventions. The issues play a significant role in developing case law, which will be analysed below.

4.1.3 The requirements for patentability

³⁸⁵ See MPEP 2106 (IV) (A) which provides: “The subject matter courts have found to be outside of, or exceptions to, the four statutory categories of invention is limited to abstract ideas, laws of nature and natural phenomena.”

³⁸⁶ *In re Alappat*, 33 F. 3d. 1526 (1994) at 1542

³⁸⁷ See *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. (20 Wall.) 498, at 507 (1874) (“idea of itself is not patentable, but a new device by which it may be made practically useful is”); *Mackay Radio & Telegraph Co. v. Radio Corp. of America*, 306 U.S. 86, at 94 (1939) (“While a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.”); *In re Warmerdam*, 33 F.3d 1354 (1994) at 1360 (“steps of ‘locating’ a medial axis, and ‘creating’ a bubble hierarchy . . . describe nothing more than the manipulation of basic mathematical constructs, the paradigmatic ‘abstract idea’”).

Section 101 of the 35 U.S.C. sets forth the general requirements for a utility patent: "whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title." Based on this section, in U.S. the utility patent application must comply with the basic three requirements of utility, novelty and nonobviousness. These three requirements are described respectively in sections 101, 102, and 103 of 35 U. S. C., the Patent Act.

4.1.3.1 Utility requirement

The utility requirement is also called useful requirement, which is the lowest bar and is easily met. The requirement for utility in section 101 is a basis for excluding frivolous or inoperable inventions from patentability. The meaning of the utility requirement is to be patented an invention must demonstrate that it is "useful" for some purpose. There are three "types" of utility that appear in precedent, which form the notion of "utility" as it is applied by the Patent Office³⁸⁸.

General utility is the notion that a patentable invention must "do something." It must have a useful function of some kind. In other words, it must be designed to address a problem or meet a need. In practice, it provides almost no barrier to the patenting of inventions: an invention can be purely entertaining and still be useful.

Specific utility refers to the ability of the invention to perform its function, i.e., does the invention actually work? It is the most commonly invoked form of utility. The specific utility

³⁸⁸ These types of Utility in the US are concluded by Nathan (1999) based on the various US courts decisions and the practice of USPTO. See, Machin, N., 1999. Prospective Utility: A New Interpretation of the Utility Requirement of Section 101 of the Patent Act. *California Law Review*, **87**(2), pp. 426- 436.

doctrine is used to invalidate inventions such as perpetual motion machines, which may have a formally describable function but which are highly unlikely to fulfill that function, i.e., they do not “do” anything tangible or achievable.

Moral utility is the requirement that an invention designed for an immoral purpose should not be patentable. This is a particular formulation of the general utility requirement. The existence of the requirement is only to protect the public from harm. It has not been invoked to invalidate patents in recent years, leading many to conclude that it is a dead doctrine.³⁸⁹

As a result of these types of utility, Shumaker (2000) has stated that a business method will almost always satisfy the utility requirement if it is capable of practical application³⁹⁰ except when it serves an illegal or immoral purpose³⁹¹.

4.1.3.2 Novelty Requirements

In order for an invention to be patentable, it must be “novel” as defined in the patent law. To determine whether the invention is novel, the 35 U.S.C. Section 102 provides that: “A person shall be entitled to a patent unless –

- a) The invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- b) The invention was patented or described in a printed publication in this or a foreign

³⁸⁹ See, *Juicy Whip, Inc. v. Orange Bang, Inc.*, 185 F.3d 1364, (1999). In this decision, the judge asserted that “the principle that inventions are invalid if they are principally designed to serve immoral or illegal purposes has not been applied broadly in recent years”.

³⁹⁰ Shumaker, S., 2000. Business Method Patents: Navigating a Sea of Controversy. [Online] Available at <<http://www.ssiplaw.com/files/busmethpat.pdf>> [Accessed 18 October 2009].

³⁹¹ Ibid. In this study, the author, Shumaker (2000), illustrated that a method for organizing arms distribution for systematic terrorism would lack utility because it would not serve a useful purpose in the eyes of society.

country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States or

- c) He [the applicant] has abandoned the invention, or
- d) The invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
- e) The invention was described in – (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty [the Patent Cooperation Treaty done at Washington, on June 19, 1970] defined in section 351(a) shall have the effects for the purpose of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; or
- f) He [the applicant] did not himself invent the subject matter sought to be patented, or
- g) (1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of

conception and reduction to practice of the invention; but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.”

The requirement is somewhat confusing because it actually covers two notions having intricate, yet distinct functions. The first is quasi procedural in nature, and helps defining the exact content of the prior art against which inventions are to be judged. Most subsections in section 102 relate directly to this task. The second notion contained in the requirement for novelty is material in nature, and refers to the identity (or the differences) between the prior art and the invention sought to be patented. Although this notion, best expressed by the term “anticipation”, is never directly mentioned as such in the Patent Act, it pervades the whole of section 102. According to it, an invention must be different from the prior art to be patentable. If the invention is identical to the prior art, it is considered as anticipated, and unpatentable. Anticipation requires that each element of the claimed invention be disclosed in a single prior art reference.³⁹² Disclosure of a prior art reference can be either express or inherent.³⁹³

The §102 states two issues related to the novelty requirement. They are statutory bar and priority.

³⁹² See notably *In re Spada*, 911 F. 2d 705 (Fed. Cir. 1985); *Richardson v. Suzuki Motor Co.*, 868 F. 2d 1226 (Fed. Cir. 1989).

³⁹³ The US Federal Circuit has recognized two general kinds of anticipation: express anticipation and inherent anticipation. First, a claimed invention is unpatentable if it is expressly anticipated by a prior art reference. To find express anticipation, the reference must expressly disclose every limitation of the claimed invention. The Federal Circuit has also stated, consistent with the rulings of its predecessor court, that a prior art reference may “inherently” anticipate a claimed invention, even if the reference does not expressly disclose the later invention. the doctrine of inherency serves to create a penumbra of structural and functional language around prior art claims, and its scope can change substantially under different circumstances. The Federal Circuit has applied the doctrine of inherent anticipation in at least three kinds of factual circumstances: (1) inherent physical properties of prior art references; (2) inherent methods of practicing an art; and (3) inherent ways of using prior art references. See, e.g., *RCA Corp. V. Applied Digital Data Sys., Inc.*, 730 F.2d 1440 (Fed. Cir. 1984); *Standard Havens Prods., Inc. V. Gencor Indus., Inc.*, 953 F.2d 1360 (Fed. Cir. 1992). The notion of anticipation by inherency forces the novelty inquiry to go beyond the mere teaching of the prior art reference. Accordingly, inherency pertains more to non-obviousness than to novelty, and should be treated as such. If inherency does not result in anticipation, one must anyway examine the same issue when determining obviousness. In consequence, treating it as a novelty issue is more confusing than helpful. For further details on inherency, see Schlicher, J., 1993. *Patent Law: Legal and Economic Principles*. New York, US: Clark Boardman

a) statutory bar

“Statutory bar” means that an inventor who does not file for patent protection on their new invention within this one year grace period will lose all right to obtain patent protection for the invention.

Strictly speaking, “statutory bar” is similar to novelty, but not the same. Novelty can only be destroyed by others because it is based on the date of invention. Statutory bar is based on the date of filing. The doctrine essentially prevents inventors from waiting too long to request a patent. Once an inventor patents, publishes, publicizes or sells their invention, they have only one year to file for a U.S. patent, or else they lose their right to protect.

35 U.S.C. Section 102 (b) provides that a patent may be obtained unless “the invention was ... in public use or on sale in this country, more than one year prior to the date for application for patent in the United States”. This section prescribes two of the most common statutory bars to patentability: the “on sale” bar and the “public use” bar. This means if an invention has been for sale or public use for over one year it is no longer patentable. There is an exception to what is considered “public use” bar or “on sale” bar, which is the “experimental purposes” use³⁹⁴ does not count as “public use” or “on sale” so long as the use is a bona fide effort to bring the invention to perfection or ensure that it will answer its designated purpose.

b) priority

³⁹⁴ See MPEP 2133.03 (a), which provides: the on-sale bar of 35 U.S.C. 102(b) is triggered if the invention is both (1) the subject of a commercial offer for sale not primarily for experimental purposes and (2) ready for patenting.

The United States employs a first-to-invent³⁹⁵ system where applicants are allowed to assert that they actually invented prior to the date a prior art reference became publicly available. This is different from many other countries where the patent is given to the first to file. To be the first to invent, the inventor must generally be: (1) The first person to “reduce the invention to practice [i.e., the first person to embody the concept of an invention]”³⁹⁶; (2) was not abandoned the invention.

There is one exception. If someone *conceives* the invention first but is not the first to reduce it to practice, they receive priority *if* they were diligent in reducing the invention to practice.³⁹⁷

“Reduction to practice” is the earliest date where the inventor can prove that they produced or applied the product or process successfully. Filing for a patent is considered to be the legal equivalent of reducing to practice if no earlier date can be proven.³⁹⁸

4.1.3.3 Nonobviousness requirement

Under 35 U.S.C. section 103, no patent may be issued if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill

³⁹⁵ It needs to be noted that the Leahy-Smith America Invents Act (AIA) was passed by Congress and was signed into law by President Barack Obama on September 16, 2011. The act switches the U.S. patent system from a “first to invent” to a “first inventor to file” system, which will take effect March 16, 2013.

³⁹⁶ Invention in the US is generally defined to comprise two steps: (1) conception of the invention and (2) reduction to practice of the invention. When an inventor conceives of an invention and diligently reduces the invention to practice (by filing a patent application, by practicing the invention etc), the inventor's date of invention will be the date of conception.

³⁹⁷ 35 USC § 102 (g), which is given in Appendix 1.

³⁹⁸ MPEP 2138.05 provides: “Reduction to practice may be an actual reduction or a constructive reduction to practice which occurs when a patent application on the claimed invention is filed. The filing of a patent application serves as conception and constructive reduction to practice of the subject matter described in the application. Thus the inventor need not provide evidence of either conception or actual reduction to practice when relying on the content of the patent application. ... In an interference proceeding, a party seeking to establish an actual reduction to practice must satisfy a two - prong test: (1) the party constructed an embodiment or performed a process that met every element of the interference count, and (2) the embodiment or process operated for its intended purpose.”

in the art to which said subject matter pertains”.

Nonobviousness adds an additional inquiry to novelty: is the invention new *enough*? In other words, whether a person having ordinary skill in the art would not know how to solve the problem at which the invention is directed by using exactly the same mechanism. In order to determine if an invention meets the nonobviousness requirement it is necessary to compare the invention to the prior art and a determination is made whether the differences in the new invention would have been obvious to a person having ordinary skill in the type of technology used in the invention.

In practice, nonobviousness is “the most important patentability requirement and the most difficult to apply”³⁹⁹ in all three of requirements because what was previously nonobvious today may become highly obvious tomorrow. (i.e. the problem of "hindsight") In Graham V. John Deere & Co. (1966)⁴⁰⁰, the Supreme Court stated that the following factors influence the nonobviousness determination:

- (1) The scope and content of the prior art
- (2) The differences between the prior art and the claimed invention.
- (3) The level of ordinary skill in the prior art.
- (4) Objective evidence of nonobviousness

Based on this case, the patent examiner will have to assess whether the invention as a whole is obvious to those of ordinary skill in the art at the time the invention was made.

³⁹⁹ Chisum, D. S., & Jacobs, M. A., 1992. *Understanding Intellectual Property Law*. New York, US: Matthew Bender & Company.

⁴⁰⁰ *Graham v. John Deere Co.* 383 U.S. 1 (1966).

4.2 The American cases on patenting business methods

"Business method" is not the subject of any specific American patent statute provision which can help readily resolve the debate with regards to whether it can be patented although according to the USPTO White Paper⁴⁰¹, the first financial patent, which is related to the business methods, was granted on March 19, 1799, to Jacob Perkins of Massachusetts for an invention for "Detecting Counterfeit Notes". This part focuses on how the leading American case law precedents have dealt with the patentability of business methods. Five leading American decisions have judicially addressed and attempted to resolve the issue of the patentability of business methods.

4.2.1 *Hotel Security Checking Co. v. Lorraine Co. (1908)*⁴⁰²

Until 1998, business methods were not commonly recognised as being protected under US patent law. Previously there was believed to be what is called "business method exception"⁴⁰³. The concept "business method exception" was conceived by the Second Circuit Court of Appeals in the decision *Hotel Security Checking Co. V. Lorraine Co. (1908)*.

On June 20, 1893, an improvement in the art of cash-registering and account-checking in hotels and restaurants was granted patent (Letters patent No. 500,071) to the applicant, John

⁴⁰¹ United States Patent and Trademark Office, 2000. USPTO White Paper – Automated Financial or Management Data Processing Methods (Business Methods).. US: USPTO. In the paper USPTO stated all details of Mr. Perkins' invention were lost in the great Patent Office fire of 1836. The first financial patent for which any detailed written description survives in USPTO was to a printing method entitled "A Mode of Preventing Counterfeiting" granted to John Kneass on April 28, 1815.

⁴⁰² *Hotel Security Checking Co. V. Lorraine Co.* 160 F. 467 (2nd Cir. 1908)

⁴⁰³ The 1994 edition of the Manual of Patent Examining Procedures (MPEP) states that methods of doing business are to be considered as non-statutory subject matter. However, this statement was removed from the subsequent edition of the MPEP, which was published in 1996. The later edition states that there is no special category for methods of doing business, and such claims should be examined in the same manner as all other process claims. In 2003, the eighth edition of MPEP §2106 stated that "Claims should not be categorized as methods of doing business. Instead, such claims should be treated like any other process claims, pursuant to these Guidelines when relevant".

Tyler Hicks. Later, it was dismissed by a decree of the Circuit Court of the United States for the Southern District of New York. The inventor, Hicks, appealed. The Second Circuit Court of Appeals affirmed the decree of the Circuit of the United States for the Southern District of New York Court on March 10, 1908.

In this case, the patent describes and claims a “method of and means for cash-registering and account-checking” designed to prevent fraud and peculation by waiters and cashiers in hotels and restaurants⁴⁰⁴. The object of the alleged invention is accurately to check the account of the cashier and of each waiter. In carrying out the system, each waiter is provided with slips of paper, marked so as to distinguish them from those used by other waiters in the same establishment. The person in charge of each department, which fills an order given by waiters, is provided with a sheet of paper ruled lengthwise in parallel columns, each waiter having a particular column exclusively appropriated to him. Each waiter is numbered or otherwise identified. The number on the slips given to a waiter will correspond with this waiter's own number and his orders will be entered in the sheet column by the person in charge of the department (e.g., the kitchen, the bar, the cigar stand or the counter) filling the orders. At the close of business the sum of the slips of each waiter in the hands of the cashier, can easily be compared with the sum of the items charged to him by the departments collectively. If there has been no carelessness or dishonesty, the amounts will agree and if there has been, it is easy to discover where the fault lies.

⁴⁰⁴ The claims read as follows: 1. The herein-described improved means for securing hotel or restaurant proprietors or others from losses by the peculations of waiters, cashiers or other employees, which consists of a sheet provided with separate spaces, having suitable headings, substantially as described, said headings being designatory of the several waiters to whom the several spaces on the sheet are individually appropriated, in conjunction with separate slips, each so marked as to indicate the waiter using it, whereby the selling price of all the articles sold may be entered in duplicate, once upon the slip of the waiter making the sale, and once upon his allotted space upon the main sheet, substantially as and for the purpose specified. 2. The herein – described improvement in the art of securing hotel or restaurant proprietors and others from losses by the peculations of waiters, cashiers or other employees, which consists in providing separate slips for the waiters, each so marked as to indicate the waiter using it, and in entering upon the slip belonging to each waiter the amount of each sale that he makes, and also in providing a main sheet having separate spaces for the different waiters and suitably marked to correspond with the numbers of the waiters and of their slips, and in entering upon said main sheet all the amounts marked upon the waiters' slips so that there may thus be a duplication of the entries, substantially in the manner and for the purpose specified.

The issue in the case is whether the claimed invention was patentable invention under the mean of Section 4886 of the Revised Statutes of the United States (U.S. Comp. Stat.1901, p. 3382) which provided: “Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor”. The principal defense in the case is the Hicks' application lacked novelty and therefore the patent should be void.

The Circuit Court of Appeals firstly indicated that the subject – matter of the claims was not a machine, manufacture or composition of matter. Thus, only when it is a “new and useful art”, the claimed subject – matter was the invention within the language of the statute. The court interpreted the word “art” as “the employment of means to accomplish some desired end; the adaptation of things in the natural world to the uses of life; the application of knowledge or power to practical purposes”⁴⁰⁵. Thus, a system of transacting business disconnected from the means for carrying out the system was not, within the most liberal interpretation of the term, an art. However, the court also stated this did not mean the claimed invention must be beyond the scope of the art within the Section 4886 of the Revised Statutes because physical means, the sheet and the slips, were described by Hicks in the invention. The issue was the “art” described in the invention was old. “The essential features were old, the changes,

⁴⁰⁵ *Hotel Security Checking Co. V. Lorraine Co.* . 160 F. 467 (2nd Cir. 1908) at 469

elaborations and improvements of the patent belong to the evolution of the business of restaurant and hotel keeping, and would, we think, occur to any clever and ingenious person familiar with the needs of that business. The truth of this proposition will be made apparent by a brief survey of the prior art".⁴⁰⁶ Furthermore, a vogue system prior to the Hicks' application in Harvey's restaurant in Washington was very similar with the Hicks' system. The principal differences between these two systems are "the substitution of paper for brass, recording each item separately instead of the total and using a recording sheet which is ruled instead of on that was not ruled"⁴⁰⁷. The Court stated "the fundamental principle of the system is as old as the art of bookkeeping, i.e., charging the goods of the employer to the agent who takes them ... If at the time of [the patent] application, there had been no system of bookkeeping of any kind in restaurants, we would be confronted with the question whether a new and useful system of cash registering and account checking is such an art as is patentable under the statute"⁴⁰⁸. Therefore, the court held that the Kicks' application lacked novelty and the patent was invalid.

Hotel Security is generally regarded as the origin of "the business method exception" and hence business method inventions are unpatentable subject matter⁴⁰⁹, because the court stated that any business method was unpatentable in this case⁴¹⁰. However, in fact the court only stated that the invention argued in this case, a system of transacting business, only when it was disconnected from the means for carrying out, was not the art within the Section 4886 of the Revised Statutes. The court did not decide whether the invention as a whole was an

⁴⁰⁶ Ibid. at page 470.

⁴⁰⁷ Ibid. at page 471.

⁴⁰⁸ Ibid. at page 472.

⁴⁰⁹ e.g. Gabay, S., 1999. The Patentability of Electronic Commerce Business Systems in the Aftermath of State Street Bank & Trust Co. V. Signature Financial Group, Inc.. *The Journal of Law & Policy*, 9(1), pp.179-226.

⁴¹⁰ Mehta, M. H. & Moskowitz, L., 2004. Business Method Patents in the United States: A Judicial History & Prosecution Practice. [Online] Available at <http://www.sughrue.com/files/Publication/54011fba-0904-4dfe-83afe5c4b0d1c538/Presentation/PublicationAttachment/5869b571-51c7-451b-bbd1-ed552fe8edc6/BusinessMethod_PatentsAIPPIprosprac.pdf> [Accesses 15 August 2009]

unpatentable subject, because it "is not necessary unless we find that Hicks has made a contribution to the art which is new and useful". In other words, the court did not affirm an invention involved business method is unpatentable subject matter.

Hence, the concept "business method exception" is an ill-conceived concept because in this case the reason for the nonpatentability of the invention was that it was not novel. In the decision, there is no clear evidence to support whether the court thought that business method - related inventions were statutory subject matter or not.

4.2.2 *In re Wait* (1934)⁴¹¹

This is an early case related to patentability of business method patents worth scrutiny, which was relied upon by the USPTO for many years to support the rule that "a method of doing business can be rejected as not being within the statutory classes".⁴¹² In the case, the application involved is entitled "Improvements in Process of Vending", which is a process of remotely posting an offered price for a commodity or security, bring together a buyer and seller to contract the sale, and finally posting the completed sales.

The examiner stated that the claims⁴¹³ of the application "contain[ed] no disclosure of an operative system"⁴¹⁴ and also the application was "drawn to a process of doing business

⁴¹¹ *In re Wait* 73 F. 2d 982 (C.C.P.A. 1934)

⁴¹² MPEP ed. 6 rev. 1 § 706.03 (a), 700-14 (Aug. 1993).

⁴¹³ The independent claim 1 provided: "The process which comprises posting an offered figure for a commodity causing the figure to be visible at a remote point, contacting the stations of a buyer and a seller through a central point, causing such contact to be indicated at the point of posting and consummating a sale through such connection and removing said posted figure."

⁴¹⁴ *In re Wait* 73 F. 2d 982 (C.C.P.A. 1934) at page 982.

which cannot form the subject matter of process claims"⁴¹⁵. Therefore, the examiner rejected the patent application on 13 May 1931. After more than one year, on 13 June, 1932, the appellant, John C. Wait, filed his appeal to the Board of Appeals and also filed a motion to amend his application so as to include a series of apparatus claims. The Board of Appeals firstly refused the new application, which included a series of apparatus claims, because the application had exceeded the six-month period for allowing the amendment of rejected claims. For the original application, although the Board of Appeals overruled the examiner as to the first ground of rejection and stated the application contained disclosure of the operative system, yet the Board affirmed as to the second which was "the application was drawn to a process of doing business which cannot form the subject matter of process claims, ... [because] none of the claims is limited to a process which requires the exercise of invention."⁴¹⁶ As a result, Wait appealed to the US Court of Customs and Patent Appeals (CCPA).

The main issue in this case was whether an invention cannot form the subject matter of process claims if it sets out to achieve a process of doing business. The appellant, Wait, argued that a physical system (suitable devices) was indeed contained in the process invention and hence should be patentable.

The CCPA first indicated that the court did not think that the concept of "methods of doing business" provided a proper reason to deviate from the patent's usual practice. To determine whether the claimed application was patentable the step should clarify the application was process invention or apparatus invention. Since amendments of the claims which directed to an apparatus were not presented within the required period (six months) for amending the rejected claims and the applicant did not show good and sufficient reasons why they were not

⁴¹⁵ Ibid.

⁴¹⁶ Ibid.

earlier presented, the court held "we have no such question before us here"⁴¹⁷ and declined the newly submitted claims in the case. According to the description of the unmodified claims, the invention is a process "to be used chiefly in connection with the business of buying and selling stocks and other commodities usually dealt in upon stock and commodity exchanges"⁴¹⁸. Although "through it [the invention] there may be an elimination of brokers and like agents as well as quickly made and accurately kept records of the transactions which take place, together with other advantages"⁴¹⁹, the court stated: "the process ... appears to comprise ... nothing more than ... giving publicity to offers of purchase or sale by one party, the acceptance thereof by another and the making of a record of the transaction ... Surely these are, and always have been, essential steps in all dealings ... even conceding, without holding, that some methods of doing business might present patentable novelty, we think such **novelty** is lacking here."⁴²⁰ Thus, the claimed process was unpatentable because it lacked novelty and not because it was a method of doing business. The court also stated it was quite conceivable that a physical system contrived to enable the carrying out of transactions such as those described might be patentable, but the court did not think it is necessary to discuss the question any further because "we have no such question before us here"⁴²¹.

In the decision, we cannot find any positive statement held by the Court of Customs and Patent Appeals that business method should be excluded from patent eligible subject matter

⁴¹⁷ Ibid. at page 983.

⁴¹⁸ Ibid. at page 982.

⁴¹⁹ Ibid.

⁴²⁰ Similarly, in *In re Howard*, 394 F.2d 869 (CCPA 1968), the court affirmed the Board of Appeals' rejection of the claims for lack of novelty and found it unnecessary to reach the Board's section 101 ground that a method of doing business is "inherently unpatentable." In *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994), while making reference to the business method exception, turned on the fact that the claims implicitly recited an abstract idea in the form of a mathematical algorithm and there was no "transformation or conversion of subject matter representative of or constituting physical activity or objects." In *In re Maucorps*, 609 F.2d 481 (CCPA 1979) and in *In re Meyer*, 688 F.2d 789 (CCPA 1982), the claimed inventions in both Maucorps and Meyer were rejected as abstract ideas under the mathematical algorithm exception, not the business method exception

⁴²¹ *In re Wait* 73 F. 2d 982 (C.C.P.A. 1934) at page 983.

per se. The court rejected the Appellant's application on the grounds that there was "no exercise" of the inventions presented in the claims and the application lack novelty. "No exercise" meant the application was abstract. "The lack of novelty" meant that the application did not have the requirements of patentability. Thus, the decision seemed to implicate that a patent application, even if it involved a process of doing business, could be patentable if the claims of it involved exercise of the invention and it otherwise satisfied the requirements of patentability. More importantly, in the case, the decision of CCPA implied that the additional apparatus claims and amendments were quite conceivable to be patentable if they were presented within the statutory period in the absence of anticipatory prior art. From this case we can conclude that a process or apparatus invention related to "methods of doing business" should be regarded as a normal process or apparatus application in assessing the patentability. The foundation of the "business methods patentability exception" used by the USPTO until recently was shaky.

4.2.3 *In re Howard* (1968)⁴²²

In this case, the claimed subject matter was a precursor to barcode retail pricing. The application disclosed a method of pricing merchandise which reduced the amount of manual handling of each of the various individual items which were shelfstocked and displayed in retail grocery stores. The method in the invention comprised "the use of a separate code marking on the label of each different kind or type of item, in conjunction with apparatus for assimilating and utilizing the code markings to supply applicable retail prices at the check-out counters in the store... a converter to compare each code input signal with the code and price

⁴²² *In re Howard*, 394 F. 2d 869 (CCPA 1968)

data stored in the memory device and feedback [this information] to the register"⁴²³. The examiner allowed claim 1⁴²⁴, but rejected claims 2 and 3 of the patent application⁴²⁵ for "failing to define [a] patentable subject matter" under 35 U.S.C. Section 100⁴²⁶ and 101⁴²⁷. The examiner observed that the steps defined in the claims "do not relate to any art but are merely directed to business techniques"⁴²⁸. The Board of Appeals affirmed the rejection on the ground that the claimed method is old and well known, and also "since the claims are drawn to a method of doing business"⁴²⁹. Therefore, the appellants appealed to the United States Court of Customs and Patent Appeals.

The issues in the case were whether the claims define a new process, or one which is in fact old and well known and whether a method of doing business is inherently unpatentable.

The appellants argued that the claimed method was different in that it used electrical means to look up the price of the item. The code stored in memory was compared with the code entered by the cashier through the keyboard allowing the converter to look up the price. Unfortunately, this argument carried little force because they conceded in their brief that "the claimed comparison may be done electrically or in any other way". The Court seized upon this admission and gave the electrical comparison no patentable significance. The court stated that "we found no basis here upon which to predicate a finding of reversible error, and we

⁴²³ Ibid at page 869.

⁴²⁴ Claim 1 read as follows: Automatic pricing and inventory control apparatus for instantaneously indicating the price and inventory quantity of each of a large plurality of different items wherein each identical item only bears a like code marking and different items bear different code markings comprising.

⁴²⁵ Claim 2: A method of handling a large plurality of materials of varying identities comprising the steps of printing labels having visible coded indicia thereon, applying said labels to separate items at points of origin thereof with the same indicia upon each of the identical items only, applying said coded indicia to a memory system at a collection and distribution point of coded items, also applying local price information on said items to said memory system in correspondence with said coded indicia thereon, registering the coded indicia of each item distributed and comparing same with the indicia on said memory system to obtain the corresponding prices thereof, and printing the coded indicia and corresponding price of each item distributed at the point of distribution as a sales slip for items distributed.

⁴²⁶ For the full text of 35 U.S.C. §102, see Appendix 1.

⁴²⁷ For the full text of 35 U.S.C. §101, see Appendix 1.

⁴²⁸ *In re Howard*, 394 F. 2d 869 (CCPA 1968) at page 870

⁴²⁹ Ibid.

therefore affirmed the decision of the Board of Appeals on the ground that the claims do not define a novel process [since the method defined is the same as that commonly used in connection with catalog sales]⁴³⁰.

Based on the conclusion, the court stated that it is unnecessary to consider the issue of whether a method of doing business is inherently unpatentable since the application has been rejected on the ground of the lack of novelty, and therefore affirmed the action of the Board of Appeals in rejecting claims 2 and 3 of an application for the method for handling materials.

In this decision, the court rejected the claimed application was not relied on that the subject matter of the invention was a business method but on the ground that the claimed method was obvious. This implicated that although the majority of the court seemed reluctant to allow business method claims, yet it also did not want to endorse that all business method claims should be excluded from patentable subject matter.

4.2.4 *Gottschalk v. Benson* (1972)⁴³¹

The claimed invention in this case was described as being related "to the processing of data by a [software] program and more particularly to the programmed conversion of numerical information" in general purpose digital computers. The claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use. They purported to cover **any** use of the claimed method in a general purpose digital computer of any type. In 1963 Benson and Tabbot filed the application to the Patent Office.

⁴³⁰ Ibid. at page 871.

⁴³¹ *Gottschalk v. Benson* 409 U.S. 63 (1972)

The patent examiner rejected the Claims 8 and 13⁴³² of the patent application as being directed to a mathematical expression. The applicant appealed to the Board of Patent Appeals and Interferences. The Board affirmed the examiner's rejection. The applicant further appealed to the Court of Customs and Patent Appeals. That Court reversed the Board. Finally, the Commissioner of Patents and Trademarks filed a petition for a writ of certiorari⁴³³ to the Supreme Court.

Although the case is not strictly related to a business method, yet the claimed invention is a process/method and is therefore interesting in our analysis. The issue in the case is whether the method described and claimed is a "process" within the meaning of the Patent Act (as required by 35 U.S.C. Section 101).

The Court emphasised that abstract ideas, laws of nature and natural phenomena are not patentable "as they are the basic tools of scientific and technological work"⁴³⁴. A patentable process must set out more than an abstract principle. In other words, "a process patent must either be tied to a particular machine or apparatus or must operate to change articles or

⁴³² Claim 8 reads: "The method of converting signals from binary coded decimal form into binary which comprises the steps of (1) storing the binary coded decimal signals in a reentrant shift register, (2) shifting the signals to the right by at least three places, until there is a binary `1' in the second position of said register, (3) masking out said binary `1' in said second position of said register, (4) adding a binary `1' to the first position of said register, (5) shifting the signals to the left by two positions, (6) adding a `1' to said first position, and (7) shifting the signals to the right by at least three positions in preparation for a succeeding binary `1' in the second position of said register." Claim 13 reads: "A data processing method for converting binary coded decimal number representations into binary number representations comprising the steps of (1) testing each binary digit position `1,' beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary `0' or a binary `1'; (2) if a binary `0' is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation; (3) if a binary `1' is detected, adding a binary `1' at the (i+1)th and (i+3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation; (4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and (5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed."

⁴³³ Certiorari is a writ (order) of a higher court to a lower court to send all the documents in a case to it so the higher court can review the lower courts. Certiorari is most commonly used by the United States Supreme Court, which is selective about which cases it will hear on appeal. To appeal to the Supreme Court one applies to the Supreme Court for a Writ of Certiorari, which it grants at its discretion and only when at least three members believe that the case involves a sufficiently significant federal question in the public interest. By denying such a writ the Supreme Court says it will let the lower court decision stand, particularly if it conforms to accepted precedents (previously decided cases.) see Hill, Gerald N., & Hill, K., 2002. *The People's Law Dictionary: Taking the Mystery Out of Legal Language*.

⁴³⁴ *Gottschalk v Benson* 409 U.S. 63 (1972) at page 67.

materials to a 'different state or thing' »⁴³⁵.

In the case, the patent sought was for a method of programming a general purpose digital computer to convert signals from a binary-coded decimal form into a pure binary form. "The procedures set forth in the present claims are of that kind [i.e. a mathematical algorithm], that is to say, they are a generalized formulation for programs to solve mathematical problems of converting one form of numerical representation into another."⁴³⁶ The machine/apparatus used in this case connected for processing the mathematical formula was an existing programmable computer. However, the processes could also be performed by a dedicated processor rather than a programmable computer. Thus, the Supreme Court held that the claims in this case did not include particular dedicated machines. Also the claim was "so abstract and sweeping as to cover both known and unknown use[s] of the BCD [Binary Coded Decimal] to pure binary conversion"⁴³⁷. Thus, the claims did not produce a novel and useful structure. The Supreme Court therefore regarded the application not to involve a transformation or reduction of an article to a different state or thing. On these grounds, the Supreme Court reversed the decision of the Court of Customs and Patent Appeals.

In the decision, the Supreme Court also stated that these criteria were not necessary conditions for patent-eligibility in all cases, and they were just "clues" to patent-eligibility. "It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a "different state or thing." We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.

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⁴³⁵ *Gottschalk v Benson* 409 U.S. 63 (1972) at page 71.

⁴³⁶ *Ibid.* at page 65.

⁴³⁷ *Ibid.* at page 68.

⁴³⁸ *Ibid.* at page 71.

The decision created a new test, the machine-or-transformation test, to decide whether a process falls under the meaning of the U.S. Patent Act. A process, which is tied to a particular machine or apparatus or operates to change articles or materials to a different state or thing, will be regarded as a patent-eligible subject matter in the US. The mere use of a general purpose machine or a use which can be replaced by other application(s) will not be regarded as "being tied to a particular machine or apparatus". Nevertheless, even if a process is not tied to a particular machine, it could still be patentable if it creates a novel and useful structure and changes articles or materials to a different state or thing. The test is just a clue as to patent-eligibility. A process which does not pass the test does not mean it is not a patent-eligible subject matter. But if a process falls within an abstract idea, law of nature and natural phenomenon, it will be a non-statutory patent-eligible subject matter.

4.2.5 *Diamond v. Chakrabarty* (1980)⁴³⁹

The subject matter of the case was an invention of a human-made, genetically engineered bacterium capable of breaking down crude oil, a property which is possessed by no naturally occurring bacterium. Although the invention was not related to a business method, however, it first interpreted a patent-eligible subject matter as "anything under the sun made by man", a phrase which has played an important role in examining whether an invention related to a business method falls under 35 U.S.C Section 101 at least between the period from the State Street Bank decision (1998)⁴⁴⁰ to the In re Bilski decision (2010)⁴⁴¹.

⁴³⁹ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

⁴⁴⁰ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998).

⁴⁴¹ *In re Bilski* 561 U.S. ____, 130 S. Ct. 3218 (2010).

In 1972, Chakrabarty, a microbiologist, filed a patent application. Chakrabarty's invention was "a bacterium from the genus *Pseudomonas* containing therein at least two stable energy-generating plasmids, each of said plasmids providing a separate hydrocarbon degradative pathway"⁴⁴². "This human-made, genetically engineered bacterium was capable of breaking down multiple components of crude oil"⁴⁴³. There were 36 claims in the application, which were of three types: "(1) process claims for the method of producing the bacteria; (2) claims for an inoculum comprised of a carrier material floating on materials such as straw, and containing the new bacteria; (3) claims to the bacteria themselves"⁴⁴⁴. The claims falling into the first two categories were allowed by the patent examiner. However, the patent examiner rejected claims for the bacteria on two grounds: "(1) that micro-organisms are a "product of nature", and (2) that, as living things, they are not a patentable subject matter under 35 U.S.C. Section 101"⁴⁴⁵. Chakrabarty appealed the rejection of the patent application to the Patent office Board of Appeals, and the Board affirmed the rejection on the second ground because "§ 101 was not intended to cover living things such as these laboratory created micro-organisms"⁴⁴⁶. However, the United States Court of Customs and Patent Appeals (CCPA), the predecessor to the present Court of Appeals for the Federal Circuit, by a divided vote, overturned the Board's decision in Chakrabarty's favor, and held that "the fact that micro-organisms ... are alive ... [is] without legal significance for purposes of the patent law"⁴⁴⁷.

Didney A. Diamond, Commissioner of Patents and Trademarks, then filed a petition for writ

⁴⁴² *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) at page 305.

⁴⁴³ *Ibid.*

⁴⁴⁴ *Ibid.* at pages 305 – 306.

⁴⁴⁵ *Ibid.* at page 306.

⁴⁴⁶ *Ibid.*

⁴⁴⁷ *Ibid.*

of certiorari to the Supreme Court. The issue of the case was whether Chakrabarty's micro-organism constitutes a "manufacture" or composition of matter" within the meaning of the statute, 35 U.S.C. § 101. To seek the certiorari from the U.S. Supreme Court the petitioner gave two arguments for the certiorari. The first argument was that "the terms 'manufacture' or 'composition of matter' do not include living things"⁴⁴⁸, which rested on the 1930 Plant Patent Act⁴⁴⁹ and the 1970 Plant Variety Protection Act⁴⁵⁰. The second argument of the petitioner was that "micro-organisms cannot qualify as a patentable subject matter until Congress expressly authorizes such protection"⁴⁵¹. The Supreme Court case was argued on March 17, 1980 and issued its decision on June 16 1980.

In the decision of the Supreme Court, the Chief Justice stated that to tackle the issues in the case it was necessary to construe 35 U.S.C § 101, which provides: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title". The court held that the statutory construction of 35 U.S.C. §101 should begin with the language of the statute. According to the decisions of Perrin v. United States (444 U.S. 37) and United States v. Dubilier Condenser Corp. (289 U.S. 178), the justice stated that: "unless otherwise defined, words will be interpreted as taking their ordinary, contemporary, common meaning"⁴⁵² and "courts should not read into the patent laws limitations and conditions which the legislature has not expressed"⁴⁵³. The court

⁴⁴⁸ Ibid. at page 311. The Commissioner of Patents and Trademarks stated the passage of the 1930 Plant Patent Act and the 1970 Variety Protection Act evidences "congressional understanding that the terms 'manufacture' or 'composition of matter' do not include living things; if they did, ... neither Act would have been necessary".

⁴⁴⁹ The act afforded patent protection to certain asexually reproduced plants.

⁴⁵⁰ The act authorized protection for certain sexually reproduced plants but excluded bacteria from its protection.

⁴⁵¹ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) at page 314. The argument rested on "the fact that genetic technology was unforeseen when Congress enacted § 101".

⁴⁵² Ibid. at page 308.

⁴⁵³ Ibid.

then read the term "manufacture" in §101 in accordance with its dictionary definition to mean "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labour or by machinery"⁴⁵⁴. "Composition of matter" includes "all compositions of two or more substances and ... all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids"⁴⁵⁵. The Court also stated that "in choosing such expansive terms as 'manufacture' and 'composition of matter', modified by the comprehensive 'any', Congress plainly contemplated that the patent laws would be given wide scope"⁴⁵⁶. Therefore, the U.S. Supreme Court concluded that "Congress intended the statutory subject matter to 'include anything under the sun that is made by man' "⁴⁵⁷. However, the court reaffirmed the limits of a patentable subject matter: "This is not to suggest that § 101 has no limits, or that it embraces every discovery. The laws of nature, physical phenomena, and abstract ideas have been held not patentable"⁴⁵⁸. Judged in this light, the court held that the respondent's micro-organism plainly qualified as a patentable subject matter because the claim is "to a non-naturally occurring manufacture or composition of matter- a product of human ingenuity"⁴⁵⁹.

In the decision, the court also stated the reasons for rejecting the two arguments of the petitioner. First, the legislative history in enacting the 1930 Plant Patent Act and the 1970 Plant Variety Protection Act did not support the petitioner's view: the terms "manufacture" or "composition of matter" had excluded living things. In both Acts, plants were excluded from patent protection based upon two arguments: one was that "the belief that plants, even those

⁴⁵⁴ Ibid.

⁴⁵⁵ Ibid.

⁴⁵⁶ Ibid.

⁴⁵⁷ Ibid. at page 309.

⁴⁵⁸ Ibid.

⁴⁵⁹ Ibid.

artificially bred, were products of nature"⁴⁶⁰, and therefore belonged to a nonpatentable subject matter; the other was that "plants were thought not amenable to the 'written description' requirement of the patent law"⁴⁶¹. Hence, "[the] relevant distinction was not between living and inanimate things, but between products of nature, whether living or not, and human-made inventions"⁴⁶². Therefore, since the respondent's micro-organism was the result of human ingenuity and research, it was a patent-eligible subject matter. As for the petitioner's second argument (that micro-organisms cannot qualify as a patentable subject matter until Congress expressly authorizes such protection), the court stated that the broad general language employed by Congress in drafting § 101 resulted in making unforeseeable inventions patent protectable under patent law. The court said that "[if] unanticipated inventions [were] without protection [this] would conflict with the core concept of patent law."⁴⁶³ When such an invention was considered as a patentable subject matter through properly construing the language of the provisions, it should be protected by patent law unless Congress has expressly excluded such inventions.

Thus, the court held that in the appeal the claimed micro-organism did indeed constitute a "manufacture" or "composition of matter" within the meaning of the US Patent Act and affirmed the judgement of the Court of Customs and Patent Appeals.

More significantly, the decision extended a patentable subject matter under 35 U.S.C. Section 101 to "anything under the sun made by man". The notion was developed in Diamond v. Diehr 450 U. S. (1981), and adopted by the court as a means of determining whether a

⁴⁶⁰ Ibid. at page 311.

⁴⁶¹ Ibid. at page 312. The court stated the reason of the fact was "new plants may differ from old only in color or perfume, differentiation by written description was often impossible".

⁴⁶² Ibid. at page 313.

⁴⁶³ Ibid. at page 315.

business method invention was a patent-eligible subject matter in State Street Bank and Trust Co. v. Signature Fin. Group, Inc. (1998).

4.2.6 *Diamond v. Diehr* (1981)⁴⁶⁴

The case was a 1981 U.S. Supreme Court decision which held that the execution of a physical process, controlled by running a computer program was patentable.

The inventors, Diehr, filed a patent application on 6 August, 1975 for “a process for molding raw, uncured synthetic rubber into cured precision products”⁴⁶⁵. The invention utilized a computer to calculate and control the heating times for the rubber in order to be best “cured” according to several factors (the thickness of the article to be moulded, the temperature of the moulding process, and the amount of time that the article is allowed to remain in the press). According to the respondents, “the industry has not been able to obtain uniformly accurate cures, because the temperature of the molding press could not be precisely measured, thus making it difficult to do the necessary computations to determine cure time”⁴⁶⁶. Thus, the invention contributed to the art. The contribution was held to reside in the process of constantly measuring the actual temperature inside the mould because, in the invention, these temperature measurements were automatically fed into a computer which repeatedly recalculated the cure time by use of the Arrhenius equation⁴⁶⁷.

⁴⁶⁴ *Diamond v. Diehr* 450 U.S. 175 (1981).

⁴⁶⁵ *Ibid.* at page 177.

⁴⁶⁶ *Ibid.* at page 178.

⁴⁶⁷ The Arrhenius equation is a formula for the temperature dependence of the reaction rate constant, and therefore, rate of a chemical reaction, which was first proposed by the Dutch chemist J. H. van't Hoff in 1884. In the Diehr's invention, the equation is used to calculate when to open the press and to remove the cured, molded rubber.

The patent examiner of USPTO rejected the respondents' claims⁴⁶⁸ on the ground that these claims were steps that were performed by a computer by means of a stored program and should not constitute a statutory subject matter under 35 U.S.C. § 101. On appeal, the U.S. Patent and Trademark Office Board of Appeals upheld the examiner's rejection. On further appeal to the Court of Customs and Patent Appeals (CCPA), the Court reversed the decision of the USPTO Board of Appeals. The court held that an otherwise patentable invention did not become unpatentable simply because a computer was involved. Diehr's claims were not directed to a mathematical algorithm or an improved method of calculation, but rather recited an improved process for moulding rubber articles by solving a practical problem which had arisen in the moulding of rubber products. Therefore the invention was a patent-eligible subject matter.

The commissioner of Patents and Trademarks argued that the decision of the Court of Customs and Patent Appeals was inconsistent with prior decisions⁴⁶⁹ of the U.S. Supreme Court. The issue in the case was whether otherwise valid claims were rendered invalid by including mathematical formulae, computer programs, or digital computers.

⁴⁶⁸ The Independent Claim 1 provided: "A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising: (1) providing said computer with a data base for said press including at least, natural logarithm conversion data (In), the Activation energy constant (c) unique to each batch of said compound being molded, and a constant (x) dependent upon the geometry of the particular mold of the press, (2) initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure, (3) constantly determining the temperature (Z) of the mold at a location closely adjacent to the mold cavity in the press during molding, (4) constantly providing the computer with the temperature (Z), (5) repetitively performing in the computer, at frequent intervals during each cure, integrations to calculate from the series of temperature determinations the Arrhenius equation for reaction time during the cure, which is $\ln(v) = CZ+x$, where v is the total required cure time, (6) repetitively comparing in the computer at said frequent intervals during the cure each said calculation of the total required cure time calculated with the Arrhenius equation and said elapsed time, and (7) opening the press automatically when a said comparison indicates equivalence. See id. footnote 5.

⁴⁶⁹ *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Parker v. Flook*, 437 U.S. 584 (1978).

The court firstly repeated the statutory construction for 35 U.S.C. § 101 as used in Diamond v. Chakrabarty, 447 U.S. 303 (1980): that a statutory subject matter could “include anything under the sun that is made by man”⁴⁷⁰. The court then defined a “process” as “a mode of treatment of certain materials to produce a given result”⁴⁷¹ and indicated that the clue to the patentability of a process claim that does not include particular machines was “[that it involved a] transformation and reduction of an article ‘to a different state or thing’”⁴⁷². The claims in this case involved the transformation of an article, i.e. “raw, uncured synthetic rubber, into a different state or thing”⁴⁷³. Also the claims were mere process claims because they described in detail “a step-by-step method for accomplishing such, beginning with the loading of a mold with raw, uncured rubber and ending with the eventual opening of the press at the conclusion of the cure”⁴⁷⁴. Therefore, the invention should receive the protection of U.S. patent laws.

The court also stated that although a mathematical equation and a programmed digital computer were used in several steps of the claims in this case, yet patenting such an invention was not inconsistent with prior decisions of the U. S. Supreme Court. In the prior decisions⁴⁷⁵, the U.S. Supreme Court had undoubtedly recognized limits to 35 U.S.C. § 101 namely that laws of nature, natural phenomena, and abstract ideas should be excluded from patent protection. However the difference between the invention in this case and the inventions in the prior decisions was that the inventors in the prior decisions sought to patent a mathematical formula⁴⁷⁶, while the respondents in this case sought patent protection for "a

⁴⁷⁰ *Diamond v. Diehr* 450 U.S. 175 (1981). at page 182.

⁴⁷¹ *Ibid.* at page 183.

⁴⁷² *Ibid.* at page 184.

⁴⁷³ *Ibid.*

⁴⁷⁴ *Ibid.*

⁴⁷⁵ *Ibid.*

⁴⁷⁶ In *Gottschalk v. Benson*, 409 U.S. 63 (1972), the Supreme Court held unpatentable claims for an algorithm used to convert binary code decimal numbers to equivalent pure binary numbers. The sole practical application of the algorithm was

process of curing synthetic rubber"⁴⁷⁷. The claims employed a well-known mathematical equation, but they did not seek to pre-empt the use of the equation. The use of computer in the invention was to avoid the possibility of overcuring or undercuring. Thereby, as a whole the claimed process did not become an unpatentable subject matter. The Supreme Court stated that "a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer ... In determining the eligibility of the respondents' claimed process for patent protection under § 101, their claims must be considered as a whole"⁴⁷⁸. Therefore, U.S. Supreme Court considered that the claimed process invention fell within the § 101 categories of possibly patentable subject matter and affirmed the judgment of the Court of Customs and Patent Appeals.

In their decision, the Supreme Court repeated that the statutory patentable subject matter should include "anything under the sun that is made by man". Only laws of nature, natural phenomena, and abstract ideas should be excluded from the § 101 categories of possibly patentable subject matter. A claim drawn to a subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer. If such a claimed invention as a whole is not directed to the mathematical formula itself, it will fall within the patent eligible subject matter under 35 U.S.C. § 101. The ability to patent software in this way was later expanded upon by the United States Court of

in connection with the programming of a general purpose digital computer. In *Parker v. Flook*, 437 U.S. 584 (1978), the claims were drawn to a method for computing an "alarm limit". An "alarm limit" is simply a number, and the court concluded that the application sought to protect a formula for computing this number. See *ibid.* at 185 - 186.

⁴⁷⁷ *Ibid.* at page 187.

⁴⁷⁸ *Ibid.* at pages 187-188.

Appeals for the Federal Circuit in patenting business methods in the State Street bank decision⁴⁷⁹.

4.2.7 *In re Schrader* (1994)⁴⁸⁰

Before 1998, most of the decisions, which rejected patent applications related to business methods, were based on the "abstract idea exception" or the lack of the other requirements for patentability⁴⁸¹. Although the business method exemption doctrine was developed by some U.S. District Court decisions⁴⁸², the Federal Circuit court's majority opinion did not tend to mention the business method exception, and only referred to the mathematical algorithm exception to 35 U.S.C. § 101.⁴⁸³ The decision in *In re Schrader* is one of the landmark cases used to interpret what is meant by a "mathematical algorithm exception".

On June 19, 1989, Rex D. Schrader and Eugene D. Klingaman (collectively Schrader) filed a patent application (U.S. Patent Application Serial No. 07/367,668, the 668 application) with the USPTO. The application was directed to a method for competitively bidding on a plurality of related items, such as contiguous tracts of land or the like. After the items had been offered to bidders, bids on one, some, or all of the items were received and entered into

⁴⁷⁹ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998)

⁴⁸⁰ *In re Schrader* 22 F. 3d 290 (Fed. Cir. 1994).

⁴⁸¹ See also *Munson v. City of New York*, 124 U.S. 601 (1888) (no patentable novelty in an accounting system for recording, organizing, indexing, recording payment and canceling of bond coupons and to prevent fraud). *Hocke v. New York Cent. & H.R.R. Co.*, 122 F. 467 (2d Cir. 1903) (means to secure against loss of freight by using document holding locations and reconciliation steps; claims invalidated as lacking invention (predecessor requirement to non-obviousness) and novelty, dicta inferring obviousness by taking judicial notice of industry's expectations for needed refinement of existing practice to avoid errors); *Dann v. Johnston*, 425 U.S. 219 (1976) (bank coding system to classify customer payments unpatentable as obvious). *Ex parte Murray*, 9 U.S.P.Q.2D (BNA) 1819, 1820 (Bd. Pat. App. & Interf. 1988) (novelty and non-obviousness lacking; "accounting method [requiring only] the entering, sorting, debiting and totaling of expenditures.").

⁴⁸² e.g. *Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, Inc.*, 546 F. Supp. 1358 (D. Del. 1983). The U.S. District Court of Delaware held that the patent in question included business method claims and should not be invalidated based on defendants' allegation that the patent is a familiar business system. More specifically, the court held that the business method would be unpatentable if done by hand, but valid in this instance because a computer is used to effectuate the business activity, the invention was patentable

⁴⁸³ *In re Schrader*, 22 F. 3d 290 (Fed. Cir. 1994).

a "record". Then, the combination of winning bids was determined by assembling a "completion" from all the entered bids. As explained in the specification, a completion was the particular combination of bids which "would complete a sale of all of the items being offered at the highest offered total price."⁴⁸⁴ The items were then sold in accordance with the "completion". The examiner rejected the claims⁴⁸⁵ for lack of being a statutory subject matter under 35 U.S. C. Section 101. Schrader appealed to the Patent and Trademark Office Board of Patent Appeals and Interferences. On 20 November, 1991, the Board affirmed the rejection apparently on three different grounds: "First, the claimed subject matter is, in our opinion, directed to subject matter that falls within a judicially determined exception to a process set forth in Section 101. The claimed process involves only information exchange and data processing and does not involve a process of transforming or reducing an article to a different state or thing. Second, the claimed method involves a mathematical algorithm or mathematical calculation steps, as the method includes a procedure for solving a given type of mathematical problem....[T]he mathematical computations of the summation of the possible bidding combinations is at the heart of the invention. Third, the issues in the case relating to the Section 101 rejection are analogous to the issues in Ex parte Murray, 9 USPQ2d 1819 (Bd. Pat. App. & Inter. 1988)⁴⁸⁶, which also involved a Section 101 rejection; *Murray* was held to be a binding precedent."⁴⁸⁷ Therefore Schrader appealed the decision of the Board to the U.S. Court of Appeals for the Federal Circuit and argued that the Board

⁴⁸⁴ Ibid. at page 291.

⁴⁸⁵ In 36 claims contained in the application, the independent and representative Claim 1 provided: A method of competitively bidding on a plurality of items comprising the steps of identifying a plurality of related items in a record, offering said plurality of items to a plurality of potential bidders, receiving bids from said bidders for both individual ones of said items and a plurality of groups of said items, each of said groups including one or more of said items, said items and groups being any number of all of said individual ones and all of the possible combinations of said items, entering said bids in said record, indexing each of said bids to one of said individual ones or said groups of said items, and assembling a completion of all said bids on said items and groups, said completion identifying a bid for all of said items at a prevailing total price, identifying in said record all of said bids corresponding to said prevailing total price. See *ibid.* at 292.

⁴⁸⁶ In this case, Joseph C. Murray applied a patent application on an accounting method he had devised on 17 August, 1979. On November, 17, 1980, he filed a second application, a continuation-in-part of his first application, and allowed his first application to go abandoned. The Examiner rejected his claims as being drawn to nonstatutory subject matter. Murray appealed to the Board of Appeals. The Board affirmed the Examiner's rejection. Murray did not appeal further, leaving his case one of the very few that had actually been rejected as a nonstatutory business method.

⁴⁸⁷ *In re Schrader*, 22 F. 3d 290 (Fed. Cir. 1994) at page 292.

incorrectly invoked the rule that a patent cannot be obtained for a mathematical algorithm in the abstract.

The key issue in the appeal related to whether mathematical principles or algorithms, especially when used to implement a way of doing business, were a patentable subject matter under 35 U.S.C. § 101. The court of appeals held that to test such an issue, the Freeman-Walter-Albele test should be used. This test was developed by the U.S. Court of Appeals for the Federal Circuit in the precedents. According to the test, "It is first determined whether a mathematical algorithm is recited directly or indirectly in the claim. If so, it is next determined whether the claimed invention as a whole is no more than the algorithm itself; that is, whether the claim is directed to a mathematical algorithm that is not applied to or limited by physical elements or process steps. Such claims are nonstatutory. However, when the mathematical algorithm is applied to one or more elements of an otherwise statutory process claim,...the requirements of section 101 are met."⁴⁸⁸

Schrader's first point was that there was no mathematical algorithm implicit in the claim. The Federal Circuit court disagreed and stated that a mathematical algorithm was implied in the claim because it "performs a mathematical calculation which a) determines possible combinations of items and/or groups with the provision that each item only appears once in each combination; and b) selects the combination with the prevailing (i.e. highest or lowest) value"⁴⁸⁹. Hence, the court stated that the invention was a process "within or similar to a class of well-known mathematical optimization procedures commonly applied to business problems"⁴⁹⁰ and a mathematical algorithm is implicit in the claim.

⁴⁸⁸ Ibid.

⁴⁸⁹ Ibid. at page 293.

⁴⁹⁰ Ibid.

Schrader further argued that even if a mathematical algorithm is implicit in the claim, the claim recites or implies a sufficient physical activity to meet the second prong of the Freeman - Walter - Abele test because "the method physically regroups raw bids into new groupings and ultimately 'completions', physically transforms bid data into completion data or display data; and makes physical changes to a 'display' "⁴⁹¹ The court stated that the grouping or regrouping of bids cannot constitute a physical change, effect or result, and "the terms 'bid data', 'completion data', or 'display data' are nowhere mentioned in the claim and there is no basis to read them into the claim"⁴⁹². The only physical effect or result which is required by the claim is the entering of bids in a "record", a step that can be accomplished simply by writing the bids on a piece of paper or a chalkboard. Such activity was insufficient to impart patentability to a claim involving the solving of a mathematical algorithm. Moreover, the step of entering data into a "record" is implicit in any application of a mathematical algorithm. The recitation of such a step in a claim involving the solving of a mathematical algorithm merely makes explicit what had been implicit, "which is different with the transformation or conversion of subject matter representative of or constituting *physical activity or objects*"⁴⁹³. Thus the claims are not patentable. Therefore the court affirmed the decision of the Board sustaining the rejection of the claims.

In the decision, the Court of Appeals cited the Freeman - Walter - Abele test to determine whether a claim that recites a mathematical algorithm was patentable. However, the test was repudiated in the decision of *State Street Bank* (1998) where it was described as having "little, if any, applicability to determining the presence of statutory Subject matter"⁴⁹⁴. Yet, it continued to have use in the patent office which viewed it as much the same as the "practical

⁴⁹¹ Ibid.

⁴⁹² Ibid. at page 294.

⁴⁹³ Ibid.

⁴⁹⁴ *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 47 U.S.P.Q.2nd 1696 (Fed. Cir. 1998)

application" and "useful, concrete and tangible results" test. Also, in In re Bilski⁴⁹⁵, it was noted that some patentable subject matter can nevertheless fail the test.

Although in the case, the Federal Circuit's majority opinion only referred to the mathematical algorithm exception to 35 U.S.C. 101, we still consider this is an important case related to business method. Firstly, the patent application in the case claimed a method for handling competitive bidding, which makes it a business method - related invention. The Federal Circuit's majority opinion did not mention the business method exception. More importantly, in Judge Newman's dissenting opinion, he stated that the term "business method" is an "unwarranted encumbrance to the definition of statutory subject matter"⁴⁹⁶. The appeal decision did not explicitly answer whether an invention directed to a pure method of doing business could be patented. But, it is reasonable to believe that the decision implies that the U.S. Court of Appeals for the Federal Circuit did not hold the principle of the "business method exception". A business method - related invention could be a patent-eligible subject matter if it met the requirements of 35 U.S.C. § 101.

4.2.8 In re Alappat (1994)⁴⁹⁷

Although the claimed invention was related to a computer, and not a business method, the decision in the case created a "useful, concrete, and tangible result" test which was subsequently used to determine whether a business method invention was patent-eligible by the court in the State Street Bank (1998) case and in later cases.

⁴⁹⁵ *In re Bilski* 561 U.S. ___, 130 S. Ct. 3218 (2010)

⁴⁹⁶ *In re Schrader* 22 F. 3d 290 (Fed. Cir. 1994) 22 F. 3d 290 at page 298.

⁴⁹⁷ *In re Alappat* 33 F. 3d 1526 (1994)

Alappat's claims were drawn to a so-called "rasterizer" which is used in a digital oscilloscope to smooth waveform data prior to displaying the waveform on the oscilloscope screen. The invention lies in the general architecture and operation of the rasterizer to substantially eliminate the appearance of discontinuities in the waveform by changing the intensity of each pixel depending on the pixel's proximity to a waveform vector. Claims 15-19 were rejected by the examiner on the ground that they were directed to a non-statutory subject matter. Alappat appealed this rejection to the Board. A three-member panel reversed the Examiner's non-statutory subject matter rejection. However, the examiner requested a reconsideration of the decision because the decision conflicted with USPTO policy. An expanded eight-member panel, which include the three members of the original panel, carried out the reconsideration and affirmed the Examiner's rejection. Alappat appealed the decision to the U.S. Court of Appeals for the Federal Circuit. On July 29, 1994, the court gave its en banc decision in the case. The majority opinion consists of two parts.

Part one addressed a jurisdictional issue of whether a decision by an "expanded" panel of the BPAI convened by the Commissioner was a valid decision, which is a prerequisite to confer appellate jurisdiction on the court. The majority held that the expanded panel was properly constituted by the Commissioner under his statutory authority and therefore the expanded panel decision was a valid decision for jurisdictional purposes.

Part two of the majority's opinion addressed the merits of the case. The issue involved an appeal from the expanded panel's decision rejecting Alappat's claims on the basis that they

were drawn to a nonstatutory subject matter under 35 U.S.C. Section 101. The expanded panel had held that the independent apparatus claim, which was written in "means-plus-function" language as permitted under 35 U.S.C. Section 112, was merely a process claim wherein each element represented a step in that process. The panel reasoned that the claim was broad enough to cover an appropriately programmed general purpose computer and, therefore, held that the claimed process was a "mathematical algorithm" which is not eligible for patent protection. In reaching its decision, the expanded panel ignored the structural description of the invention in the patent application.

The majority opinion reversed the expanded panel's decision and held that Alappat's invention was in fact a "machine," and so fell into one of the four categories of patentable subject matter under Section 101. The majority chastised the Board for ignoring the physical structure described in the application. The majority stated that just because the claims cover a programmed general purpose computer does not make them nonstatutory. Instead, a programmed general purpose computer becomes a new machine once a computer program is loaded into memory, and is therefore eligible for patent protection. The court also held that the claimed invention was a practical application of mathematical algorithm or formula because it produced "a useful, concrete and tangible result".

4.2.9 State Street Bank Co. & Trust v. Signature Financial Group, Inc. (1998)⁴⁹⁸

In this decision the US Supreme Court first stated that the "business method exception" had

⁴⁹⁸ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998)

never been invoked by a US Supreme Court or a US Court of Customs and Patent Appeals (CCPA).

On 9 March, 1993 the USPTO issued a patent, which was entitled "Data processing system for Hub and Spoke financial services configuration" (Patent No. 5,193,056, to be called 056 patent), to Signature Financial Group, Inc. ("Signature"). The "056" patent is generally directed to a data processing system for implementing an investment structure which was developed for use in Signature's business as an administrator and accounting agent for mutual funds. The system facilitated a structure whereby mutual funds (Spokes) pool their assets in an investment portfolio (Hub) organized as a partnership. This investment configuration provides the administrator of a mutual fund with the advantageous combination of economies of scale in administering investments coupled with the tax advantages of a partnership. The patent application originally included six apparatus and six method claims. The six method claims were "phrased identically to the apparatus claims except for the absence of means-plus-function language"⁴⁹⁹. The six apparatus claims⁵⁰⁰ were determined to be patentable, while the six method claims were rejected by the examiner of the USPTO. The record does not disclose why the method claims were not successfully prosecuted. After the "056 patent" was granted, "Signature" informed its competitors, State Street Bank & Trust Co. ("State Street"), which served as the custodian and accounting agent for several multi-tiered fund complexes, that any data processing system designed to perform book accounting for a multi-tiered fund arranged in a Hub and Spoke configuration would likely infringe the "056 patent".

⁴⁹⁹ See the decision of the US District Court for the District of Massachusetts 927 F.Supp. 502 (D.Mass, 1996).

⁵⁰⁰ Of the six claims, the independent claim is the first claim, which is described as: a data processing system for managing a financial services configuration of a portfolio established as a partnership, each partner being one of a plurality of funds, comprising: (a) computer processor means for processing data; (b) storage means for storing data on a storage medium; (c) first means for initializing the storage medium; (d) second means for processing data regarding assets in the portfolio and each of the funds from a previous day and data regarding increases or decreases in each of the funds, assets and for allocating the percentage share that each fund holds in the portfolio; (e) third means for processing data regarding daily incremental income, expenses, and net realized gain or loss for the portfolio and for allocating such data among each fund; (f) fourth means for processing data regarding daily net unrealized gain or loss for the portfolio and for locating such data among each fund; and (g) fifth means for processing data regarding aggregate year-end incomes, expenses, and capital gain or loss for the portfolio and each of the funds.

“State Street” attempted to negotiate with “Signature” for a license to use its patented data processing system. However, the negotiations broke down. Therefore, “State Street” brought a declaratory judgment action asserting invalidity, unenforceability, and noninfringement in the Massachusetts District Court. On 26 March 1996, the motion of “State Street” was granted. Patti B. Saris, a United States District Judge, concluded and ordered that the court “holds that the patent is directed to non-statutory subject matter under § 101, hereby, the claims of Signature are dismissed and patent withdrawn”. Signature appealed to United States Court of Appeals for the Federal Circuit.

"State Street" alleged that Signature's patent (the 056 patent) was not drawn to a statutory subject matter under 35 U.S.C. § 101 because the invention claims were an unpatentable mathematical algorithm as defined by established Supreme Court precedents. "Signature" countered that its data processing system was a computer-implemented invention that was patentable both under recent Federal Circuit precedents and also guidelines for patent examiners issued by the U.S. Patent and Trade Mark Office (USPTO).

The core issue in the case was whether a computer-implemented invention, that essentially performed a mathematical accounting function, was invalid because of failure to claim a statutory subject matter under 35 U.S.C. § 101⁵⁰¹.

To resolve the issue, the lower court, the US District Court for the District of Massachusetts, first stated what is the categories of patentable subject matter under 35 USC § 101: "The statute [herein, 35 USC § 101] sets out four categories of subject matter - process, machine, manufacture, and composition of matter - that are entitled to patent protection provided that

⁵⁰¹ For the full text of 35 U.S.C. § 101, see Appendix 1.

the other requirements of patentability (i.e. novelty and nonobviousness) are satisfied."⁵⁰²

However, the District Court went on to state that "this is not to suggest that § 101 has no limits or that it embraces every discovery"⁵⁰³, although in the judgement of Diamond v. Chakrabarty, 447 U.S. 303, "§ 101 has been broadly construed to 'include anything under the sun that is made by man'"⁵⁰⁴. But "the laws of nature, physical phenomena, and abstract ideas have been held not patentable ... as they are the basic tools of scientific and technological work"⁵⁰⁵. Granting a patent monopoly on these categories (i.e. the laws of nature, physical phenomena, and abstract ideas), rather than on their particular practical application, would "impede rather than 'promote the Progress of Science and Useful Arts' [which is provided by] U.S. Const. Art. I, Cl. 8"⁵⁰⁶.

Thus, a mathematical algorithm, as an abstract idea, is not a patentable invention unless it is used to create a novel and useful structure. In other words, a mathematical algorithm is not a patentable subject matter but a practical application of a mathematical algorithm will be patentable if the other requirements (i.e. novelty and nonobviousness) of patentability are satisfied. The statement of the District Court was approved by the Court of Appeals for the Federal Circuit (CAFC), which stated that: "Of particular relevance to this case, the Court has held that mathematical algorithms are not patentable subject matter to the extent that they are merely abstract ideas. See Diehr, 450 U.S. 175, *passim*; Parker v. Flook, 437 U.S. 584 (1978); Gottschalk v. Benson, 409, U.S. 63 (1972)"⁵⁰⁷.

⁵⁰² *State Street Bank & Trust Co. v. Signature Financial Group* 927 F.Supp. 502 (D.Mass, 1996) at page 503.

⁵⁰³ *Ibid.*

⁵⁰⁴ *Ibid.* at page 504.

⁵⁰⁵ *Ibid.*

⁵⁰⁶ *Ibid.*

⁵⁰⁷ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998)

Thus, the core issue of the case, whether a computer-implemented invention, that essentially performs mathematical accounting functions, was invalid for failure to claim statutory subject matter under 35 USC § 101, became a question as to whether the claimed invention was merely an abstract idea.

The difference of approach between the District Court and the Court of Appeals was how to determine whether the subject matter was an unpatentable abstract idea in practice.

The District Court held that: "[the] distinction between abstract idea and patentable subject matter, however, is more easily stated than applied"⁵⁰⁸. Through the consideration of three cases (i.e. In re Freeman, 573 F.2d 1237 (C.C.P.A.1978); In re Walter, 618 F.2d 758 (C.C.P.A. 1980); and In re Abele, 684 F.2d 902 (C.C.P.A. 1982)) involving mathematical algorithms, the District Court stated that the Court of Customs and Patent Appeals (CCPA, the predecessor to the present Court of Appeals for the Federal Circuit) articulated the Freeman-Walter-Abele test (also to be called mathematical algorithm/physical transformation test) as the best clue to determine the patentability of a computer-implemented invention (in the case, the invention is a computer-implemented business method) when considering the doctrine of the unpatentability of a mathematical algorithm because a mathematical algorithm is necessarily involved in all computer programs. Considering the argument in "Signature", which is that "[the] patent claims a machine rather than a process, and a machine is explicitly statutory under § 101"⁵⁰⁹, the District Court held that the claims⁵¹⁰ were directed to a process with each "means" clause merely representing a step in that process and therefore it was reasonable to view "machine" claims, which had "means" clauses, as process claims because there was no supporting structure in the written description that corresponds to the claimed

⁵⁰⁸ *State Street Bank & Trust Co. v. Signature Financial Group* 927 F.Supp. 502 (D.Mass, 1996)

⁵⁰⁹ *State Street Bank & Trust Co. v. Signature Financial Group* 927 F.Supp. 502 (D.Mass, 1996) at page 506

⁵¹⁰ *Ibid.*

"means" elements according to the decision of In re Alappat (22 F.3d 1526, 31 USPQ 2d 1545 (Fed Cir. 1994)). Also the District Court stated that according to the decision of In re Alappat (22 F.3d 1526, 31 USPQ 2d 1545 (Fed Cir. 1994)), "the mathematical algorithm/physical transformation test for statutory subject matter under § 101 applies even to 'true apparatus' claims"⁵¹¹.

The District Court first indicated the 056 patent indeed provides a data processing system and a method for ...making all calculations... [and] most importantly, the claims themselves recite calculating data as a function of the machine"⁵¹². Therefore, the District Court concluded that "the 056 patent claims recite a means for solving a series of mathematical problems"⁵¹³. The District Court observed "neither does the invention measure physical objects or phenomena...nor does it physically convert data into a different form..."⁵¹⁴ because "the 056 patent claims an invention that essentially performs mathematical calculations on data gleaned from pre-solution activity and stores and displays the results... the fact that those numbers represent financial constructs, such as Hub and Spoke configurations, does not save Signature's patent; The claims do not recite any significant pre- or post-solution activity"⁵¹⁵.

The Freeman-Walter-Abele test, was described in the appeal as follows: "It is first determined whether a mathematical algorithm is recited directly or indirectly in the claim. If so, it is next determined whether the claimed invention as a whole is no more than the algorithm itself; that is, whether the claim is directed to a mathematical algorithm that is not applied to or limited by physical elements or process steps. Such claims are nonstatutory. However, when the mathematical algorithm is applied to one or more elements of an otherwise statutory

⁵¹¹ Ibid.

⁵¹² Ibid.at page 507.

⁵¹³ Ibid.

⁵¹⁴ Ibid.

⁵¹⁵ Ibid.at page 509.

process claim, ... the requirements of section 101 are met."⁵¹⁶.

The District Court concluded that on the basis of this test Signature's data processing system, which recite a mathematical algorithm and "involves no further physical transformation or reduction than inputting numbers, calculating numbers, outputting numbers, and storing numbers, [and because] the same functions could be performed, albeit less efficiently, by an accountant armed with pencil, paper, calculator, and a filing system"⁵¹⁷, the invention was nonstatutory patentable subject matter.

Unlike the decision of the District Court, the Court of Appeals for the Federal Circuit (CAFC) said that the claims were directed to a machine because the written description of independent claim 1 was disclosed "as corresponding to the respective 'means' recited in the claims"⁵¹⁸. "Each claim component, recited as a 'means' plus its function, is to be read, of course ... as inclusive of the 'equivalents' of the structures disclosed in the written description portion of the specification. Thus, claim 1, properly construed, claims a machine, ... which machine is made up of, at the very least, the specific structures disclosed in the written description and corresponding to the means-plus function elements (a) - (g) recited in the claim."⁵¹⁹

As a "machine", the CAFC held that the Signature's invention was a proper statutory subject matter under § 101.

The CAFC further indicated the District Court erred by applying the Freeman-Walter-Abele

⁵¹⁶ Ibid.

⁵¹⁷ Ibid. at page 508.

⁵¹⁸ Ibid.

⁵¹⁹ Ibid.

test to determine whether the claimed subject matter was an unpatentable abstract idea: "the Freeman-Walter-Abele test has little, if any, applicability to determining the presence of statutory subject matter"⁵²⁰, according to the decision of In re Alappat, 33 F.3d at 1543, 31 USPQ 2d (Fed. Cir. 1994). The CAFC had pointed out that the "application of the test could be misleading, because a process, machine, manufacture, or composition of matter employing a law of nature, natural phenomenon, or abstract idea is patentable subject matter even though a law of nature, natural phenomenon, or abstract idea would not, by itself, be entitled to such protection."⁵²¹

The CAFC also held that if an invention involved a mathematical algorithm which produced "a useful, concrete and tangible result", as set forth in In re Alappat 33 F.3d at 1543, 31 USPQ 2d (Fed. Cir. 1994), it would fall within the statutory patent-eligible subject matter. In the appeal it was held that, "it is of little relevance whether claim 1 is directed to a "machine" or a "process", as long as it falls within at least one of the four enumerated categories of patentable subject matter [herein, process, machine, manufacture, and composition of matter]" because Signature's invention produces "a useful, concrete and tangible result", which was a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

Another ground of the District Court decision for invalidating Signature's patent was a doctrinal exclusion from subject matter patentability known as the "business method

⁵²⁰ Ibid.

⁵²¹ In In re Alappat, 33 F.3d at 1543 (Fed. Cir. 1994) at page 1557, the CAFC held "under Benson, this [herein, Freeman-Walter-Abele test] may have been a sufficient indicium of nonstatutory subject matter. However, after Diehr and Alappat, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers and storing numbers, in and of itself, would not render it nonstatutory subject matter, unless, of course, its operation does not product a "useful, Concrete and tangible result". Repeated by the CAFC in the decision of State Street Bank Co. & Trust v. Signature Financial Group, Inc. 149 F. 3d 1368 (Fed. Cir. 1998)

exception". The District Court held that a series of older cases⁵²² had established a principle that is "'business plans' and 'systems' are not patentable". In the appeal it was noted that "during licensing negotiations, Signature informed State Street that any data processing system designed to perform book accounting for a multi-tiered fund based on a partnership portfolio configuration would infringe the 056 patent".⁵²³ The District Court determined that the invention of Signature's patent was a business method invention per se. Hence based on the "business methods exception", the invention should not be protected by patent.

However, the Court of Appeals indicated that the "business method exception" is ill-conceived. The business method exception had never been invoked by the court of Appeals, or the Court of Customs and Patent Appeals (CCPA), to deem an invention unpatentable. It was observed that, "[the] application of this particular exception herein, the business method exception] has always been preceded by a ruling based on some clearer concept of Title 35 or more commonly, [on the] application of the abstract idea exception based on finding a mathematical algorithm."⁵²⁴ Thus, it is unreasonable to reject all patent applications involving business methods just on the grounds of the ill-conceived "business method exception" principle. The Court of Appeals held that "business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method".

By directing a machine and producing a useful, concrete and tangible result, the claims of

⁵²² For example, *Loew's Drive-In Theatres, Inc. v. Park-In Theatres, Inc.*, 174 F.2d 547 (1st Cir.); *Hotel Security Checking Co. v. Lorraine Co.*, 160 F. 467 (2nd Cir. 1908) etc. See the decision *State Street Bank & Trust Co. v. Signature Financial Group* 927 F.Supp. 502 (D.Mass, 1996)

⁵²³ *State Street Bank & Trust Co. v. Signature Financial Group* 927 F.Supp. 502 (D.Mass, 1996) at 506

⁵²⁴ *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F. 3d 1368 (1998). The Judgement illustrated in *In re Howare*, 394 F.2d 869, 157 USPQ615 (CCPA 1968), the reason of the rejection of the claims is lack of novelty. In re Schrader, 22 F. 3d 290, 30 USPQ 2d 1455 (Fed. Cir. 1994), the claims implicitly recited an abstract idea in the form of a mathematical algorithm and there was no transformation or conversion of subject matter representative or constituting physical activity or objects. The more illustratives see the decision of *State Street Bank Co. & Trust v. Signature Financial Goroup, Inc.* 149 F. 3d 1368, 47 U.S.P.Q. 2d 1596 (Fed. Cir. 1998).

Signature's patent, as a whole, were affirmed by the CAFC and shown to be directed to a patent-eligible subject matter under 35 U.S.C. §101. Therefore, on 23 July 1998 the United States Court of Appeals for the Federal Circuit reserved the appealed decision and remanded the case to the District Court for further proceedings consistent with their opinion.

The decision decisively put an end to the business method exception. Business methods should be subject to the same legal requirements for patentability as applied to any other invention. If the claims of a business method invention are directed to a machine, the invention will be a patent-eligible subject matter. However, if the claims of a business method invention are directed to a process, the test to be used to examine its patent application was still not definitively answered. At the very least, the claims, as a whole, should produce a useful, concrete and tangible result. But, the CAFC in the appeal did not indicate what exactly a useful, concrete and tangible result accounted to.

4.2.10 AT & T v. Excel Comm. Corp. (1999)⁵²⁵

In the case, based on the decision of State Street Bank (1998), the Federal Circuit further clarified its position with respect to business method patents, holding that a business method is a patentable subject matter as a process under 35 U.S.C. §101.

In 1992, AT&T CORP. filed a patent application, which is entitled "Call Message Recording for Telephone Systems". The USPTO initially rejected the application (for reasons unrelated to section 101) in respect of all forty-one of the originally filed claims. After amendment, on July 26, 1994 the USPTO granted a patent (U.S. Patent No. 5,333,184, the 184 patent)

⁵²⁵ *AT&T v. Excel Comm. Corp.* 172 F. 3d 1352 (Fed. Cir. 1999).

without questioning whether the claims were directed to a statutory subject matter under section 101. The patent is described as a message record for long-distance telephone calls that is enhanced by adding a primary interexchange carrier (PIC) indicator. The addition of the indicator aids long-distance carriers in providing differential billing treatment for subscribers, depending upon whether a subscriber calls someone with the same or a different long-distance carrier. The amended patent claims contained six independent claims, being five method claims and one apparatus claim, and some additional dependent claims. In 1996, AT&T asserted ten of the method claims against Excel in a patent infringement suit which was brought in the District Court for the District of Delaware (AT&T, 1998 WL 175878). The court was of the view that the only physical step in the claims involved data-gathering prior to the use of algorithms. Although the court recognized that the claims required the use of switches and computers, it nevertheless concluded that use of such facilities to perform a non-substantive change in the data's format could not serve to convert a non-patentable subject matter into a patentable subject matter. Thus the trial court, on summary judgment, held all of the method claims at issue to be invalid for failure to qualify as a statutory subject matter. AT&T CORP. appealed to the United States Court of Appeals for the Federal Circuit.

The issue on appeal was whether the asserted claims of the 184 patent were invalid for failure to claim a statutory subject matter under 35 U.S.C. 101. Excel argued that the PIC indicator value was derived using a simple mathematical principle (a Boolean principle). The method claims containing the mathematical algorithms were patentable subject matters only if it could be shown that there was a 'physical transformation' or conversion of a subject matter from one state into another. According to the mathematical algorithm exception, the patent of AT & T should be invalid.

The Court of Appeals for the Federal Circuit referred to the decision of Diamond v. Chakrabarty (447 U.S., 1980) and Diehr (450 U.S., 1981), and identified that the Supreme Court has broadly construed 35 U.S.C. § 101 (which provided the US statutory patentable subject matter) as follows: "Congress intended [that the] statutory subject matter includes anything under the sun that is made by man"⁵²⁶. And only three categories were excluded from the statutory, which were "law of nature, natural phenomena, and abstract ideas"⁵²⁷.

The lower court held that the claims at issue, though otherwise falling within the terms of 101, implicitly recited a mathematical algorithm and thus fell within the judicially created "mathematical algorithm" exception to the statutory subject matter. The Court of Appeals for the Federal Circuit disagreed because in their view the category of unpatentable subject matter mathematical algorithms should be narrowly limited to those that are in the abstract. In Benson (409 U.S. at 65), the mathematical algorithm had been described as a "procedure for solving a given type of mathematical problem". In State Street Bank & Trust Co. v. Signature Fin. Group, Inc., (149 F.3d, 47, 1998) a claim constituted a practical application of a mathematical algorithm if it produced a useful concrete and tangible result and if so it should be patentable. In re Alappat (33 F. 3d, 31, 1994) a mathematical algorithm may be an integral part of a patentable subject matter such as a machine or process if the claimed invention as a whole is applied in a "useful" manner. In this case, AT&T's claimed process employed subscribers' and call recipients' PICs as data, applied Boolean algebra to those data to determine the value of the PIC indicator, and applied that value through switching and recording mechanisms to create a signal useful for billing purposes. Hence, the CAFC concluded that the district court did not apply the proper analysis to the method claims at issue. The claims of the 184 patent are within the broad scope of patentable subject matter

⁵²⁶ Ibid. at page 1355.

⁵²⁷ Ibid.

under 35 U.S.C. Section 101.

After the discussion of the mathematical algorithm exception, the CAFC turned to the arguments of the parties. The court admitted that the PIC indicator value is derived using a Boolean principle. But the court also stated the use of the Boolean principle was not determinative for the invention because "AT & T does not claim the Boolean principle as such, or attempt to forestall its use in any other application"⁵²⁸. According to the written description of the patent, the court identified that the 184 patent was only a process that used the Boolean principle in order to determine the value of the PIC indicator. The PIC indicator represents information about the call recipient's PIC, and this was a "useful, non-abstract result that facilitates differential billing of long-distance calls"⁵²⁹.

Another argument of Excel was that "method claims containing mathematical algorithms are patentable subject matter only if there is a 'physical transformation' or conversion of subject matter from one state into another."⁵³⁰ The CAFC stated that the notion of "physical transformation" was misunderstood by Excel because it is not "an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application"⁵³¹. The CAFC held that to determine whether a method claim containing a

⁵²⁸ Ibid. at page 1358.

⁵²⁹ Ibid.

⁵³⁰ Ibid.

⁵³¹ Ibid. In this decision the CAFC quoted the decision of *Diehr*, 450 U.S. at 192, to illustrate the statement. In the decision of *Diehr*, the Supreme Court noted: "when [a claimed invention] is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of 101", and stated "herein, the 'e.g.' signal denotes an example, not an exclusive requirement. Therefore, the court stated "no physical limitations or transformations are required for a patentability determination under Section 101". The CAFC also stated in the patents of previous cases (e.g. *State Street* 149 F. 3d at 1371, *Alappat* 33 F.3d at 1541.) it was true physical limitations were set forth in the descriptive of the claims. However, these claims written in this manner require supporting structure in the written description that corresponds to the claimed "means" elements. If the claims are directed to a process, a structural inquiry is unnecessary. Also, in the second part of the earlier test, "Freeman - Walter - Abele test", physical limitations are necessary. However, this test is not an improper analysis, which has been stated in *Alappat* decision (33 F. 3d at 1543) and *State Street decision* (149 F. 3d at 1374). Therefore, the court stated no physical limitations or transformations are required for a patentability determination under Section 101.

mathematical algorithm is a patentable subject matter should be regarded as a process and so focuses on whether the mathematical algorithm was applied in a practical manner to produce a useful concrete, and tangible result.

In the case, the CAFC repeated that only three categories should be excluded from the statutory, 35 U.S.C. §101. These were "law of nature, natural phenomena, and abstract ideas". A business method is a patentable subject matter as a process under 35 U.S.C. §101. The court also stated that no physical limitations or transformations were required for a patentability determination under Section 101. If a useful, concrete, and tangible result is produced by a practical manner of application and the application does not pre-empt other uses of a mathematical principle or other abstract ideas, the application will be a patentable subject matter.

4.2.11 *In re Bilski* (2010)⁵³²

On 10 April, 1997 petitioner Bernard L. Bilski ("Bilski") filed a patent application for a method of hedging risks in commodities trading. The serial number for the patent application is 08/833,892. The patent application described a method for providing a fixed bill energy contract to consumers. Under fixed bill energy contracts, consumers would pay monthly prices for their future energy consumption in advance of winter, based upon their past energy use. The monthly prices remain the same no matter how much energy they then use. Thus, consumers save money relative to others if, for example, in a given winter the weather is

⁵³² *In re Bilski* 561 U.S. ___, 130 S. Ct. 3218 (2010)

unusually cold and they therefore use an unusually large amount of energy for heating. On the other hand, consumers would pay more than others if a winter was unusually warm and their energy use was lower than average. In March 2006, all 11 of the claims⁵³³ were rejected by the patent examiner on the grounds that “the invention is not implemented on a specific apparatus and merely manipulates [an] abstract idea and solves a purely mathematical problem without any limitation to a practical application, therefore, the invention is not directed to the technological arts”⁵³⁴. In other words, the examiner stated that invention is an abstract “idea”, and apparently a “mathematical algorithm”, and does not fall within the “technological arts”.

The applicants appealed the rejection to the Board of Patent Appeals and Interferences on 26 September 2006. Although the Board of Patent Appeals and Interferences (BPAI hereafter) affirmed the rejection, the grounds held by the BPAI are different with the examiner. The BPAI held the examiner erred to relay upon a “technological arts” test because the case law did not support such test was a separate and distinct test for statutory subject. Further, BPAI held that the requirement of a specific apparatus was also erroneous because a claim that did not recite a specific apparatus may still be directed to a patent-eligible subject matter where there was a transformation of a physical subject matter from one state to another. However, the claims did not involve any patent-eligible transformation, therefore, the Board held that the transformation of “non-physical financial risks and legal liabilities of the commodity

⁵³³ The independent claim 1 read as follows: a method for managing the consumption risk costs of a commodity sold by a commodity provider at a fixed price comprising the steps of: (a) initiating a series of transactions between said commodity provider and consumers of said commodity wherein said consumers purchase said commodity at a fixed rate based upon historical averages, said fixed rate corresponding to a risk position of said consumer; (b) identifying market participants for said commodity having a counter-risk position to said consumers; and (c) initiating a series of transactions between said commodity provider and said market participants at a second fixed rate such that said series of market participant transactions balances the risk position of said series of consumer transactions.

⁵³⁴ See Board of Patent Appeals and Interferences decisions (Appeal No. 2002-2257) at page 3.

provider, the consumer and the market participants”⁵³⁵ was not a patent-eligible subject matter. The Boards finally held that the applicants’ process as claimed did not produce a “useful, concrete and tangible result”, and for this reason as well was not drawn to a patent-eligible subject matter. The applicants appealed the rejection to the Federal Circuit.

When *Bilski* appealed to the Federal Circuit, a three-judge panel heard oral arguments in the case, following usual procedure. However, before the panel rendered a decision, the Federal Circuit took the unusual step of ordering an *en banc* rehearing *sua sponte*, which was held on May 8, 2008. On October 30, 2008, the *en banc* court rejected BPAI’s test for determining whether a claimed invention was a patentable “process” under Patent Act 35 U.S.C. Section 101, i.e. whether the invention produced a “useful, concrete, and tangible result”, holding instead that the claims were not directed to a “patent-eligible subject matter” under the machine-or-transformation test. The reason was that “purported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the machine – or – transformation test to determine patent – eligibility of process claims, because they are not physical objects or substances and they are not representative of physical objects or substances”⁵³⁶. After the order by the Federal Circuit, the applicants then petitioned the Supreme Court for writ of certiorari in February 2009. In the decision handed down on 28 June 2010, the Supreme Court of the United States issued an opinion on the appeal that affirmed the judgment of the CAFC, but revised many aspects of the CAFC’s decision.

⁵³⁵ See Board of Patent Appeals and Interferences decisions (Appeal No. 2002-2257) at page 43.

⁵³⁶ *In re Bilski* 545 F. 3d 943 at page 963.

The issues presented in the case included the following three questions: (1) whether the claimed application (08/833,892 patent application) was patent-eligible subject matter under 35 U.S.C. § 101? (2) what standard should govern in determining whether a process is patent-eligible subject matter under section 101? (3) whether a method or process must result in a physical transformation of an article or be tied to a machine to be patent-eligible subject matter under section 101? Bilski argued that since a lot of patents had been issued on the old standard in State Street Bank decision (1998), and that the patent system did not explicitly limit business method patents, the claimed invention should be granted.

Both the Supreme Court and the CAFC together reiterated that the text of 35 U.S.C. Section 101 indicated four independent categories that were eligible for protection: processes, machines, manufactures, and compositions of matter. Although the text of § 101 is broad, it is not without limit. There are “three specific exceptions to Section 101’s broad patent-eligibility principles: laws of nature, physical phenomena, and abstract ideas” because “the concepts covered by these exceptions are ‘part of the storehouse of knowledge of all men ... free to all men and reserved exclusively to none’ ”⁵³⁷. This means that even if the subject matter belongs to “processes, machines, manufactures, or compositions of matter”, if it claims “laws of nature, natural phenomena, or abstract ideas”, the claim will be not a patent-eligible subject matter.

In the case, the Supreme Court agreed with the opinion of the CAFC where it stated that “it is undisputed that [the] Applicants’ claims are not directed to a machine, manufacture, or composition of matter and should be [regarded as] a “process”.

⁵³⁷ Ibid. at page 952.

However, as both the courts indicated, a patent-eligible process should be limited because a process is still able to belong to the three specific exceptions to § 101's broad patent-eligibility principles. Thus, the meaning of "process" as used in § 101 is narrower than its ordinary meaning. The issue argued in the case focused on what the term "process" in 35 U.S.C. Section 101 meant, or in other words, how a court should determine whether a given process claim is involved to the term "process" as used in § 101.

In the en banc CAFC decision, the opinion of the court written by the Chief Judge Michel stated that the Supreme Court had enunciated a test to determine whether a process claim is tailored narrowly enough to encompass only a particular application of a fundamental principle rather than to pre-empt the principle itself, which is called the "machine-or-transformation test." "A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."⁵³⁸ The Supreme Court also supported the use of the "machine-or-transformation test" to determine whether some claimed inventions were processes under § 101. The Supreme Court said that "this Court's precedents establish that the machine-or-transformation test is a useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under §101."⁵³⁹

The main difference between the CAFC's decision and the Supreme Court's decision focus on whether the machine-or-the transformation test is the sole test for deciding what constitutes a "process" under § 101.

In the CAFC's opinion, the Court stated (which Supreme Court had endorsed) that machine-

⁵³⁸ Ibid. at page 954.

⁵³⁹ 561 U.S. ___, 130 S. Ct. 3218 (2010) at page 8.

or-transformation test is a definitive and exclusive test to determine whether a process claim is a process under § 101. It did this by revisiting three precedents (the Supreme Court's decisions in *Benson*, *Flook* and *Diehr*).

In the CAFC's decision, the Court also reviewed the precedents and analysed several other "purported" tests in deciding patent-eligible subject matter. The court first addressed the Freeman-Walter-Abele test, which had two steps: (1) determining whether the claim recited an "algorithm"; then (2) determining whether the algorithm was applied in any manner to the physical elements or process steps. The court rejected the test because it conflicted with the Supreme Court's proscription against dissecting a claim and evaluating patent-eligibility on the basis of individual limitations. The claim should be analysed as a whole. A claim failing the Freeman-Walter-Abele test "may nonetheless be patent-eligible"⁵⁴⁰. The Court revisited the "useful, concrete, and tangible result" test and stated: "a useful, concrete and tangible result may in many instances provide useful indications of whether a claim is drawn to a fundamental principle or a practical application of such principle, [however], the inquiry is insufficient to determine whether a claim is patent-eligible under § 101"⁵⁴¹. The court also believed that a process tied to a particular machine, or transforming or reducing a particular article into a different state or thing, will generally produce a "concrete" and "tangible" result. Next, the court turned to the so-called "technological arts test" that some amici urged the court to adopt, which stated that patents should be reserved only for "technological" inventions that involve the application of science or mathematics and should exclude "non-technological inventions" such as "activities whose ability to achieve their claimed goals depended solely on contract formation"⁵⁴². The CAFC held that such a test "would be unclear because the meanings of the terms 'technological arts' and 'technology' are both ambiguous

⁵⁴⁰ *In re Bilski* 545 F. 3d 943 at page 959.

⁵⁴¹ *Ibid.*

⁵⁴² *Ibid.* at page 960.

and ever changing. And no such test has ever been explicitly adopted by the Supreme Court or [Court of Appeals for the Federal Circuit], as the Board correctly observed here”. Therefore the Court declined to use the technological arts test. The Court also addressed the Comiskey test, which bars any claim reciting a mental process that lacks significant “physical steps”. The Court held that the Comiskey test was misunderstood and did not exist in the CAFC’s Comiskey decision. “We [CAFC] did not so hold, nor did we announce any new test at all in Comiskey. Rather, we simply recognized that the Supreme Court has held that mental processes, like fundamental principles, are excluded by § 101 because phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts ... are the basic tools of scientific and technological work.”⁵⁴³ Thus, the Court stated: “as a result, even a claim that recites ‘physical steps’ but neither recites a particular machine or apparatus, nor transforms any article into a different state or thing, is not drawn to patent-eligible subject matter. Conversely, a claim that purportedly lacks any ‘physical steps’ but is still tied to a machine or achieves an eligible transformation passes muster under § 101”⁵⁴⁴.

However, the Supreme Court explicitly stated that the machine-or-transformation test is not the sole test for patent eligibility under § 101 although it is a useful and important clue or investigative tool. The ground of this decision involved two principles of statutory interpretation: (1) Courts “should not read into the patent laws limitations and conditions which the legislature has not expressed”⁵⁴⁵; and (2) unless otherwise defined, words will be interpreted as taking their ordinary, contemporary, common meaning. Adopting the machine-or-transformation test as the sole test for what constitutes a “process” under § 101 violated these statutory interpretation principles. “The [Supreme] Court is unaware of any ordinary, contemporary, common meaning of the definitional term ‘process’ that would require the term

⁵⁴³ Ibid.

⁵⁴⁴ Ibid. at page 961.

⁵⁴⁵ *In re Bilski* 561 U.S. ___, 130 S. Ct. 3218 (2010) at page 6.

to be tied to a machine or to transform an article."⁵⁴⁶ Hence, the Supreme Court indicated that the Court of Appeals incorrectly concluded that the Supreme Court had endorsed the machine-or-transformation test as the exclusive test. The test was never intended to be exhaustive or exclusive by the Supreme Court. The Supreme Court also stated that in earlier eras, especially in the Industrial Age, it was true that patents for inventions that did not satisfy the machine-or-transformation test were rarely granted. Yet the court had acknowledged that with the changing of the times "technology and other innovations progress in unexpected ways"⁵⁴⁷. Therefore, there are reasons to doubt whether the machine-or-transformation test should be the sole criterion for determining the patentability of inventions in the Information Age. Indeed, in the CAFC's decision, the court has implied that the future development of technology may present difficult challenges to the machine-or-transformation test. However, the Court of Appeals stated that "we certainly do not rule out the possibility that this court may in the future refine or augment the test or how it is applied. **At present**, however, and **certainly for the present case**, we see no need for such a departure and reaffirm that the machine-or-transformation test, properly applied, is the governing test for determining patent eligibility of a process under §101"⁵⁴⁸.

However, although the Supreme Court rejected the machine-or-transformation test as an exclusive test to determine what constitutes a patentable "process", the court still refused to define the term "patentable process" because "the patent application can be rejected under the Court's precedents on the [basis of the] unpatentability of abstract ideas, [and] the [Supreme] Court, therefore, need not define further what constitutes a patentable 'process', beyond pointing to the definition of that term provided in section 100(b)"⁵⁴⁹. Also, if business

⁵⁴⁶ Ibid. at page 2.

⁵⁴⁷ Ibid. at page 8.

⁵⁴⁸ *In re Bilski* 545 F. 3d 943 at page 956.

⁵⁴⁹ *In re Bilski* 561 U.S. ___, 130 S. Ct. 3218 (2010) at page 16.

methods were not patentable in any circumstances this would render § 273 meaningless. Thus, if a business method claim presents an attempt to patent abstract ideas, it will be unpatentable. But beyond this, the Patent Act leaves open the possibility that there are at least some processes that can be fairly described as business methods that are within the patentable subject matter under § 101. However, a particular business method, which fits into the statutory definition of a "process", must be novel, nonobvious, and have utility in order to receive patent protection.

Based on this analysis, the Supreme Court in the final analysis concluded that the Claims 1 and 4 were unpatentable abstract ideas which were used to explain the basic concept of hedging and reduce that concept to a mathematical formula. The remaining claims were broad examples of how hedging can be used in commodities and energy markets, and as a result were attempts to patent the use of the abstract idea of hedging. This process was followed by the use of a well-known random analysis technique to establish some of the inputs into the mathematical equation. Hence, the patent application in the case fell outside § 101 because it claims an abstract idea.

According to the case, the machine-or-transformation test was a useful and important clue, an investigative tool, for determining whether some claimed inventions were processes under §101. However, the test was not a sole test for deciding whether a process is patent-eligible, because technology and other innovations progress in unexpected ways. Also, the "useful, concrete and tangible result test" is "insufficient to determine whether a claim is patent-eligible under § 101"⁵⁵⁰. This means that if a business method claim can produce a "useful, concrete and tangible" result, and also can be proved that not to be an abstract idea, then the

⁵⁵⁰ Ibid. at page 5.

claim will be a patentable subject matter under § 101 even if it cannot satisfy the machine – or - transformation test. Nevertheless, the Supreme Court did not identify any new test, and the "useful, concrete and tangible" test and Machine-or-transformation test will therefore still direct the patent examination for some time to come.

4.3 Summary

Under the U.S. Patent Act, 35 U.S.C., an invention is patentable if it can meet the following criteria: (1) it is an invention under the meaning of 35 U.S.C. Section 101; (2) it is "useful" for some purpose, i.e., the "utility requirement" (see 35 U.S.C. Section 101); (3) it must be novel (see 25 U.S.C. Section 102); and (4) it should not be obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

From the above cases of the United States Court of Appeals for the Federal Circuit and the Supreme Court, the issue for patenting business method - related inventions in US focuses on whether the inventions are patent eligible subject matter.

In fact, the U. S. Patent Act did not rule any statutory exceptions to patentability. The Supreme Court has continuously stated "the courts should not read into the patent laws limitations and conditions which the legislature has not expressed" (Diamond v. Chakrabarty 447 U.S. 303 (1980)), and "unless otherwise defined, words will be interpreted as taking their ordinary, contemporary, common meaning" (Diamond v. Chakrabarty 447 U.S. 303 (1980)). Thus, the statutory patentable subject matter should include "anything under the sun that is made by man" (Diamond v. Chakrabarty 447 U.S. 303 (1980); AT &T v. Excel Comm. Corp. 172 F. 3d 1352 (1999)). According to the broad language of the statutes, the Supreme Court

holds that only three categories should be regarded as non-patentable subject matter. These are abstract ideas, laws of nature and natural phenomena (Gottschalk v. Benson 409 U.S. 63 (1972); Diamond v. Chakrabarty 447 U.S. 303 (1980); AT &T v. Excel Comm. Corp. 172 F. 3d 1352 (1999)). From the U.S. Constitution and the U.S. Patent Act, we cannot find any expression that the US legislature intended to exclude business method - related inventions from the statutory patentable subject matter. In fact, in the earlier judicial history of the US, the only ground for rejecting give a business method - related invention a patent is lack of novelty (Hotel Security Checking Co. v. Lorraine Co. 160 F. 467 (2nd Cir. 1908); In re Wait 73 F. 2d 982 (1934); and In re Howard 394 F.2d 869 (1968)). Therefore, only where the business method - related invention **as a whole** (In re Schrader 22 F. 3d 290 (1994); State Street Bank Co. & Trust v. Signature Financial Group, Inc. 149 F. 3d 1368 (1998)) constitutes an abstract idea⁵⁵¹, will the claim be excluded on the ground of the exceptions to patentability held in the Supreme Court precedents.

However, it is often difficult to distinguish a patent-eligible business method invention from an abstract idea, especially when the claim is only directed to a "process". Early on, the "useful, concrete, and tangible result" test, which was created and developed by the U.S. Court of Appeals for the Federal Circuit, was adopted to determine whether a business method - related invention was a patent-eligible subject matter. Under the test, if a business method - related invention can produce a useful concrete and tangible result, it would have been regarded as a patentable subject matter (In re Alappat 33 F. 3d 1526 (1994); State Street Bank Co. & Trust v. Signature Financial Group, Inc. 149 F. 3d 1368 (1998); AT &T v. Excel Comm. Corp. 172 F. 3d 1352 (1999)). However, the test was overruled by the U.S. Court of

⁵⁵¹ A business method is a method, based on commercial interests, to conduct administration or customer service. See section 1.4 Chapter one of this thesis. According to the definition, it is obvious that business method - related invention can not constitute a law of nature or a natural phenomenon.

Appeals for the Federal Circuit sitting *en banc* (In re Bilski 545 F. 3d 943(2008)) and also was not endorsed by the Supreme Court (In re Bilski 561 U.S. ___ (2010)). The CAFC Court had held that the test was insufficient to determine whether a claim is patent-eligible under § 101 and this decision was approved in the Supreme Court..

Considering insufficiency of the “useful, concrete and tangible” test, the “machine-or-transformation” test was subsequently used to determine whether a business method – related invention is patent-eligible under the meaning of 35 U.S.C. § 101. This test provides a useful and important clue or is an investigative tool (Gottschalk v. Benson 409 U.S. 63 (1972); In re Bilski 561 U.S. ___ (2010)). Thus if a claimed business method – related invention is tied to a particular machine or apparatus, or transforms a particular article into a different state or thing, it will be a patent-eligible subject matter.

Notably, in the Bilski Decision the Supreme Court did not explicitly state what a specific or particular machine is. The Supreme Court only held that a **mere** use of general purpose machine **and** the use which **can be carried out** by other application(s) should not be regarded as "being tied to a particular machine or apparatus" (Gottschalk v. Benson 409 U.S. 63 (1972)). This statement held by the Supreme Court seems can be understood that an invention which use a general purpose machine can be regarded as “being tied to a particular machine or apparatus” if the use of general purpose machine is necessary and cannot be carried out by other application(s) (at least which will be regarded like this by the skilled person in the art).

Nevertheless, even if a business method - related invention is not tied to a particular

machine/apparatus, the invention will still be a patent-eligible subject matter if it transforms a particular article into a different state or thing (Gottschalk v. Benson 409 U.S. 63 (1972); In re Bilski 545 F. 3d 943 (2008)). The required transformation "must be central to the purpose of the claimed process" and must concern certain articles (In re Bilski 545 F. 3d 943 (2008)).

However, the machine-or-transformation test is not the sole test for what constitutes a patent-eligible business method – related invention (In re Bilski 561 U.S. ___ (2010)). Only abstract ideas, laws of nature and natural phenomena should be regarded as non-patentable subject matter, and business method – related inventions are unlikely to be laws of nature or natural phenomena because they are used to conduct some administration or customer service. Even if a business method – related invention cannot satisfy the machine-or-transformation test, nevertheless if it can be proved that the claim as a whole is not simply an abstract idea, then such an invention will be a patent-eligible subject matter.

Thus, the approach in deciding the patentability of a claimed invention related to a business method in the U. S. seems to involve the following steps (illustrated in table 2: steps for examining business method – related invention in U.S.).

The first step is to distinguish the type of the claimed invention. If the claimed invention involves a "new" machine/manufacture to implement one or more business methods, as a machine/manufacture claim, the invention will be a patent-eligible subject matter because it is outwith the concept of "abstract ideas" (see In re Alappat 33 F. 3d 1526 (1994): "... become a new machine ... and is therefore eligible for patent protection". See also 2106 of U.S. MPEP "Note that an apparatus claim with process steps is not classified as a "hybrid" claim; instead,

it is simply an apparatus claim including functional limitations"). Thus if the invention can then meet the utility, novelty and nonobviousness requirements, it will be patentable.

If the claimed invention is only directed to process(es) (business method (s), a composition of business method(s) and computer program(s), or a composition of business method (s) and other process(es), even a composition of business method (s) with the other nonstatutory subject matter (s) (laws of nature, natural phenomena, abstract ideas)), to examine such invention the following approach will use the machine-or-transformation test which will provide a useful clue to determine whether the claim is a patent-eligible process. If the claimed process is tied to a machine/physical apparatus and the machine/physical apparatus is particular, the invention will be regarded as patent-eligible invention. If the claimed process is not tied to a machine/physical apparatus, or although the claimed process is tied to a machine/physical apparatus yet the machine/physical apparatus is not particular, the following step is used to assess whether the claimed process transforms an article from one thing or state to another. If the answer for the step is yes, the claimed process is still a patent-eligible invention. If not, it does not mean the claimed process is excluded from the patent-eligible subject matter. If it can be proved that the claimed process is not abstract idea (as well as law of nature, or natural phenomenon), it will be a patent-eligible subject matter. However, at the very least, a patent-eligible process should produce "useful, concrete and tangible" result.

Nevertheless, the above steps are only able to test whether the claimed invention is patent-eligible. To be patented a patent-eligible invention must go on to qualify the utility, novelty and nonobviousness requirements.

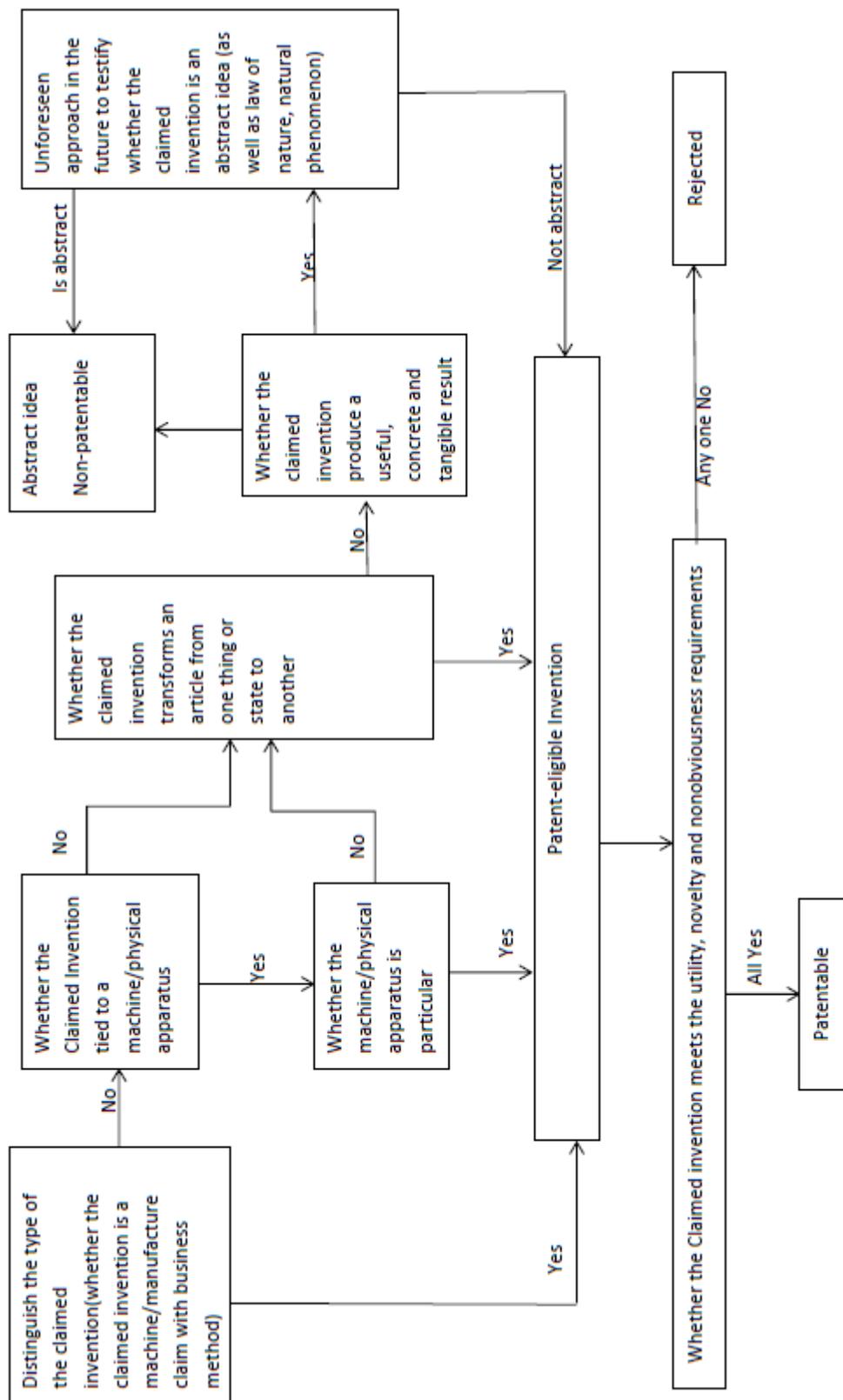


Table 2: steps for examining business method – related invention in U.S.

4.4 The differences between the US and European patent regulations related to business method patentability

4.4.1 The comparison on patent eligible business method - related inventions between in the US and in Europe

In the justification for accepting business method as a patent eligible subject matter, the US courts have stated that the business method exception was much misconceived by the United States Patent and Trademark office⁵⁵². The US patent - related statutory texts do not specifically express what are the exceptions to patentable subject matter. They only specify four independent categories of inventions that are eligible for protection: processes, machines, manufactures, and compositions of matter. The only exceptions to patentable subject matter created by precedent, which are inherently held by the US Supreme Court, are: laws of nature, natural phenomena and abstract ideas. This is because they are "part of the storehouse of knowledge of all men ... Free to all men and reserved exclusively to none."⁵⁵³ Yet in Europe, the EPC lists what is not patentable rather than conversely detailing what is. According to Article 52(2) and (3), a method of doing business as such cannot be patented. According to the decisions of the EPO Boards of Appeal the criteria to determine whether an invention is a business method as such lies in whether the claimed subject has a technical character⁵⁵⁴.

Thus, a business method - related machine/manufacture invention (or to be called herein a "business method - related physical entity invention") could be either a combination of machine/manufacture and business method invention or just a machine/manufacture

⁵⁵² *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F.3d 1368 (1998).

⁵⁵³ *Funk Brothers Seed Co. V. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

⁵⁵⁴ See Section 3.3, Chapter Three.

invention which is used to implement a business method(s). In either case it will be a patent eligible subject matter because such machine/manufacture inventions obviously do not fall into the excluded categories of laws of nature, natural phenomena and abstract ideas.⁵⁵⁵ Similarly, in Europe according to the decisions of the EPO Boards of Appeal, where an invention involves a physical entity (a tangible apparatus) which by its operation gives a technical character, it is a patent eligible subject matter⁵⁵⁶. Hence, for physical entity inventions, which are business method related, they will be patent eligible in both jurisdictions - it can be seen that the scope in Europe is effectively equal to that in the US. A good example, Pettersson's invention which is of just this sort and which was granted patent in the US (US patent number: 4,675,647) and in Europe (European patent number: EP 0086199). The invention was called "system for determining the queue sequence for serving customers at a plurality of service points"⁵⁵⁷. In the US, the application was filed on 18 March 1983 and the patent was granted on 23 June 1987. In Europe, the patent was also applied for and granted. In Europe, in the decision T1002/92, the Boards of Appeal stated that the claimed subject matter in the case was an apparatus invention in fact and concerns business method and a tangible apparatus was clearly technical in nature. Hence, the invention fell within the patent eligible subject matter under EPC Article 52.

When a business method related invention does not belong to machine/manufacture inventions, the US and Europe adopt different approaches to consider whether the invention

⁵⁵⁵ See Section 4.3, Chapter Four.

⁵⁵⁶ See Section 3.3, Chapter Three.

⁵⁵⁷ The independent claim 1 provided: a system for determining a queue sequence for serving customers at a plurality of service points, comprising: - a turn-number device having a selection unit enabling a customer to select a desired service point among said plurality of service points; - a turn-number allocating unit allocating a turn number to every customer desiring to be served; - a plurality of terminals located at corresponding ones of said service points, each of said terminals providing a signal identifying a particular service point which is free for serving a customer; - an information unit; - and computer means operatively coupled to said turn-number device and said allocating unit and said information unit for memorizing a sequence of allocated turn-numbers with selected desired service points, and for receiving from each of said plurality of terminals a signal identifying a particular service point which is free for serving a customer; said computer means employing the signals of respective ones of said terminals for deciding which particular turn-number is to be served at a particular free service point, and for feeding-out a particular turn-number to be served being a next in turn in a memorized sequence of allocated turn-numbers for which no desired service point is selected, or for which a selected desired service point is the particular free service point.

is a patent eligible subject matter. In Europe, such an invention will be patent eligible if it has a technical character. If it has no technical character such an invention will be regarded as a business method "as such" and will be excluded from being a patent eligible subject matter. "Technical character " means (1) a physical entity or a technical means is used to implement the method (as well as to implement any other excluded subject matter listed in Article 52 (2) which is related to business method (e.g. if it is implemented by means of a computer programme); and (2) if no physical entity or technical means was involved in the invention, a technical effect is achieved by the invention.⁵⁵⁸ In the US, such an invention will be regarded as a process in considering its patent eligibility. A patent eligible process is a practical application or uses an abstract idea or ideas (or (s) of nature or natural phenomenon(s)). The "machine - or - transformation" test is an important clue to distinguish whether a process invention is a practical application/use or not. The "machine - or - transformation" test provides: a claim to a process qualifies to be considered for patenting if it (1) is tied to a particular machine or tangible apparatus; or else (2) transforms an article from one thing or state to another. However, the "machine - or - transformation" test is not a unique test for this purpose. If (in the future) a process invention would be proved to fall outwith an abstract idea in an (as yet unforeseen) manner, then the invention would be patent eligible. Yet, a process invention which cannot qualify under the "useful, concrete and tangible result" test should be regarded as falling within an abstract idea.⁵⁵⁹

Referring to the European approach, when a claimed business method - related process invention is tied to a particular machine or tangible apparatus⁵⁶⁰, the particular machine or

⁵⁵⁸ See Section 3.3, Chapter Three.

⁵⁵⁹ See Section 4.3, Chapter Four.

⁵⁶⁰ The US Supreme Court did not explicitly stated what is specific or particular machine, even if in the recent case, *In re Bilski* (561 U.S. ___ (2010)) and seems to have left the discussion to future cases. According to the precedents (e.g. *Gottschalk V. Benson* 409 U.S. 63 (1972)) we can only conclude the Supreme Court held a mere use of general purpose the machine and the use which can be replaced by other applications(s) should not be regarded as "being tied to a particular machine or apparatus". This seems mean if the use of the machine in an process invention is to performs a particular function

tangible apparatus constitutes the technical character of the invention (Europe) and will also qualify the first step of the "machine - or - transformation" test (US). Therefore the claimed invention is patent eligible in both the US and Europe. A good example is Hicks' invention, which was considered in Hotel Security Checking Co. v. Lorraine Co. (1908) (US: 160 F. 467), will be illustrated to discuss this statement. The invention described and claimed a "method of and means for cash-registering and account-checking" designed to prevent frauds and peculation by waiters and cashiers in hotels and restaurants. The object of the alleged invention was accurately to check the account of the cashier and of each waiter. Each waiter was provided with slips of paper, marked so as to distinguish them from those used by other waiters in the same establishment. The person in charge of each department that fulfills an order given by waiters, was provided with a sheet of paper ruled lengthwise in parallel columns, each waiter having a particular column exclusively appropriated to him. Each waiter was numbered or otherwise marked. The use of paper slips gives the invention a technical character and in addition a tangible apparatus (paper slips) was involved, and therefore as a whole the invention would be a patent eligible invention under the EPC. However in the US, although the use of the paper slips had deviated from the general purpose of paper slips in restaurants, the invention still could not be regarded as being "tied to" the particular machine because the use could be replaced by another application(s)⁵⁶¹. Even if a particular tangible apparatus is not tied to such a process invention, the change in the purpose of an existing tangible apparatus, which in fact results from the process itself or a tangible or intangible apparatus provided by the process, should be regarded as a transformation from one state to another and hence would qualify the second step of the "machine - or -

that is beyond mere general purpose of the machine the invention is a process invention implemented with a "particular machine". However if the use can be replaced by other application(s) it will do not be regarded as being "tied to" the machine. In fact in the patent practice, such an invention claims generally to be described as an combination of process and machine/tangible apparatus.

⁵⁶¹ However, this does not mean such an invention is nonpatent eligible subject matter. Especially, if the invention is claimed as manufacture invention it should be patent eligible subject matter because the paper slips has become a new specific physical entity through marking since in the decision of In re Alappat, (33 F. 3d 1526 (Fed. Cir. 1994) the court held a programmed general purpose computer becomes a new machine once a computer program is loaded into memory.

transformation" test, and after so qualifying this would make it a patent eligible subject matter in the US.

When a claimed business method - related process invention is implemented by a general purpose machine (or tangible apparatus), it is patent eligible under the EPC because a machine or tangible apparatus means a technical character has been involved in the working of the invention.⁵⁶² However such an invention may or may not be a patent eligible subject matter in the US.⁵⁶³ If it transforms an article from one thing or state to another, it will be a patent eligible subject matter in the US. Yet even if such a claimed business method - related process invention does not transform an article from one thing or state to another, it doesn't mean it must be a non-patent eligible subject matter. If such an invention can be shown to produce a "useful, concrete and tangible" result⁵⁶⁴ then as a whole the invention falls outwith being simply an abstract idea. A hypothetical example, although not being related to a business method, but which may help us to understand the possible differences in assessing the patent eligibility of such an invention, would be where a claimed process invention is implemented by a general purpose machine or tangible apparatus. An example of this would be an invention which is a method of positioning the golfer's dominant hand so that the golfer can improve his control over putting speed and direction⁵⁶⁵. In Europe such an invention will be patent eligible because the method is implemented by means of a golf grip, a tangible apparatus. In the US, the invention cannot qualify under the "machine – or – transformation"

⁵⁶² See Section 3.3, Chapter Three.

⁵⁶³ See Section 4.3, Chapter Four.

⁵⁶⁴ According to USPTO Manual of Patent Examining Procedure (MPEP) (2010), in 2106 Patent Subject Matter Eligibility [R-6], "useful result" means the invention has to be (i) specific, (ii) substantial and (iii) credible; "tangible result" means a real-world result; "concrete result" means the result can be substantially repeatable or substantially produce the same result again.

⁵⁶⁵ The hypothetical invention is quoted from Stobbs, G. A., 2002. *Business Method Patents*. New York, US: Aspen Publishers. The independent claim provides: a method of gripping a putter comprising the steps: gripping a putter grip with the dominant hand; placing the non-dominant hand over the interior wrist portion of the dominant hand behind the thumb of the dominant hand; resting the middle finger of the non-dominant hand on the styloid process of the dominant hand; pressing the ring finger and the little finger of the non-dominant hand against the back of the dominant hand; pressing the palm of the non-dominant hand against a forward surface of the putter grip as the non-dominant hand squeezes the dominant hand.

test because (1) use of a golf grip does not tie to a particular machine/tangible apparatus, and (2) no article is transformation by the golf grip, which will remain golf grip despite different gripping methods. However, the invention does still produce a “real-world result” since it improves a golfer's control over his putting speed and direction. The result is specific, substantial, credible and repeatable. Hence, it would qualify the “useful, concrete and tangible” result test. Nevertheless, it would not be patent eligible⁵⁶⁶ since in the decision of *In re Bilski* (US 561 U.S. _ 2010) the US Supreme Court held a "useful, concrete and tangible result" test was inadequate to distinguish between a patent eligible and non-patent eligible subject matter.

When a business method - related process invention is implemented without any machine or tangible apparatus, it may or may not be a patent eligible subject matter in the US or in Europe. In Europe, if such an invention achieves a technical effect or solves a technical problem it will be patent eligible.⁵⁶⁷ In the US, if such an invention transforms an article from one thing or state to another it will be patent eligible. And even if such an invention does not transform any article from one thing or state to another, it may still be patent eligible if it can be shown that a "useful, concrete and tangible" result was produced by the invention and, as a whole, the invention falls outwith an abstract idea.⁵⁶⁸ In Europe when a business method - related invention, which is implemented without any tangible apparatus, achieves a technical effect, even if no "useful" or/and "concrete" result is produced by the invention, it will still be a patent eligible subject matter. However despite the knowledge of current technology, due to the limitation of the author's knowledge, it is difficult to give an example of such an invention in this thesis. So far as the author is aware such a patentable invention does not

⁵⁶⁶ In fact according to the author's knowledge, although the invention does not qualify the “machine – or – transformation” test, but it has fallen out of the abstract idea because it is a practical application of abstract idea. However, due to the present US judicial precedent, we can not exclude in the future US precedents will give an new test which can be relied upon to change my current idea. Hence, I have to say in the thesis it could be unpatent eligible.

⁵⁶⁷ See Section 3.3, Chapter Three.

⁵⁶⁸ See Section 4.3, Chapter Four.

exist today. According to the concept of "business method" defined in Chapter One of this thesis, a business method - related invention implemented without any tangible or intangible apparatus (to be called hereafter a "pure business method invention") it is difficult to produce any technical effect. A pure business method would be, for example, a way of conducting administration or giving customer service. The changes that result from the use of a pure business method are only in the field of customer service (e.g. saving a customer's time, improving a customer's satisfaction) or administration (e.g. streamlining an organisation, or reducing the staff)⁵⁶⁹, both of which are excluded by their nature from being "technical". Even if the business method were implemented with an intangible apparatus (e.g. with computer programme), the related invention (at present) would still be regarded as a business method - related invention implemented with a tangible apparatus because so far today an intangible apparatus still needs to be implemented in a tangible entity, for example in a computer or similar device(s) for operating software. Hence, it seems that a patent-eligible business method invention which is implemented without any tangible apparatus is not an impossibility in Europe. However, the author is not prepared to predict with confidence that in the future a business method invention implemented without any tangible apparatus would definitely not produce any technological effect since direction of the development of technology is most uncertain. All we can say so far, is that today a business method related invention implemented without any tangible apparatus would not be a patent eligible subject matter in Europe. However, in the US if such an invention could be shown to that it fall outwith an abstract idea, then it would be a patent eligible subject matter.

If we assume that, in the future, following on the development of technology there are business method - related inventions implemented without any tangible apparatus but which

⁵⁶⁹ However, "saving the customer's time", "streamlining the organisation", and "reducing the staff" are the result in the real-world.

can produce a technical effect or a "useful, concrete and tangible" result, then there may be a possible difference in considering the patent eligibility of such an invention between the US and Europe. This would be: (1) a business method - related invention implemented without any tangible apparatus, which achieves a technical effect or solves a technical problem but which falls within an abstract idea defined by the US patent law because in this situation the US patent law would rule that it produces a "useful" and "concrete" result⁵⁷⁰, which would be a patent eligible subject matter in Europe but a non-patent eligible subject matter in the US; or (2) a business method - related invention implemented without any tangible apparatus, but which produces a "useful, concrete and tangible result" and falls outwith an abstract idea but which cannot achieve any technical effect⁵⁷¹, and which would be a patent eligible subject matter in the US but a non-patent eligible subject matter in Europe.

When a business – method related process invention is implemented with an intangible apparatus⁵⁷² (e.g. software), if the intangible apparatus needs to be conducted with a tangible apparatus, in determining whether the claimed invention is patent – eligible subject matter, either in the US or in Europe, the invention should be regarded as a business – method related process invention implemented with a tangible apparatus. This means, such an invention will be patent – eligible in Europe because a technical character (tangible apparatus) is involved.⁵⁷³ However, in the US only when an apparatus involved in the invention is particular and indispensable or it transforms an article from one thing or state to another, the claimed invention can be patent-eligible.⁵⁷⁴ If an intangible apparatus involved in the

⁵⁷⁰ "Achieving technical effect" does not mean it can produce "useful" and/or "concrete" result.

⁵⁷¹ According to the author's understanding, "achieving technical effect" means a real-world result is produced. However, "producing a real-world result" does not mean technical effect is achieved. To explain the statement, a bit inconsiderate example is the method of putting the golfer's dominant hand which has been illustrated above. In this case, the method improves control over putting speed and direction and produces a real-world result, but there is no technical effect on the golf grip.

⁵⁷² See Section 1.3.4, Chapter One of this thesis, wherein the author indicated that in this study intangible apparatus is specified software. It could be developed using new information technology in the future.

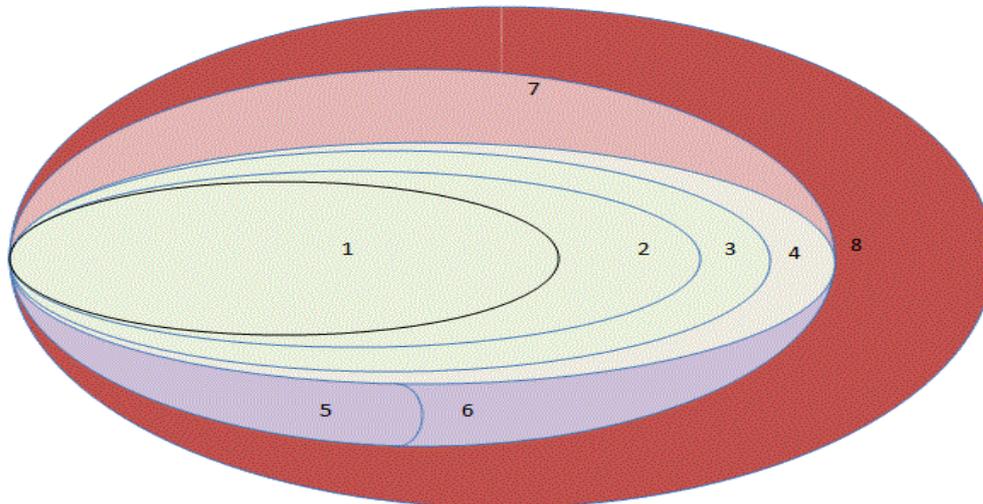
⁵⁷³ See Section 3.3, Chapter Three.

⁵⁷⁴ See Section 4.3, Chapter Four.

invention is conducted without any tangible apparatus, in both regions (the US and Europe) the invention should be regarded as a business – method related process invention implemented without any tangible apparatus. However, as the reasoning in previous paragraph, such an invention only acts on a way of doing business which is abstract and which is not technical, therefore it cannot achieve a technical effect or transform an article from one thing or state to another (at least so far today). Thus a business method – related process invention implemented with intangible apparatus(es) and without any tangible apparatus is a non-patent eligible subject matter either in the US or in Europe (at the very least so far as today).

The difference in the scope of patent eligible business method - related inventions as between the US and Europe can be shown in the figure below:

Figure 1: Comparison of the scope of patent eligible business method – related inventions as between the US and Europe



①+②+③+④: patent eligible business method - related inventions in both the US and Europe.

①: Business method - related machine/manufacture (physical entity) inventions.

②: Business method - related process inventions which are tied to a particular machine (tangible apparatus).

③: Business method - related process inventions which are implemented by means of a general purpose machine (tangible apparatus), which transforms an article from one thing or state to another or as a whole can be proved to fall outwith any abstract idea as defined in the US in an (as yet unforeseen) approach which is for determining whether a process falls outwith any abstract ideas as defined in the US.

④: (OR POSSIBLY) Business method - related process inventions implemented without any tangible apparatus but which achieves a technical effect and as a whole is shown proved to fall outwith any abstract idea as defined in the US .

⑤+⑥: Patent eligible business method - related inventions in Europe but at the same time being excluded from being a patent eligible subject matter in the US.

⑤: Business method - related process inventions implemented within a general purpose machine (tangible apparatus), which does not transform an article from one thing or state to another but falls within an abstract idea as defined in the US.

⑥ (OR POSSIBLY) Business method related process inventions implemented without any tangible apparatus which achieves a technical effect but fall within an "abstract idea" as defined in the US but which produces a "useful" and "concrete" result as defined in the US.

⑦ (OR POSSIBLY) Patent eligible business method - related inventions in US but excluded from being a patent eligible subject matter in Europe: Business method - related process inventions implemented without any tangible apparatus which falls outwith any abstract idea as defined in the US but which does not produces any technical effect.

⑧ nonpatent eligible business method - related inventions in both US and Europe.

①+②+③+④+⑤+⑥ Patent eligible business method - related inventions in Europe

①+②+③+④+⑦ Patent eligible business method - related inventions in Europe and in the US

According to the above analysis, if the probable and possible situations are excluded, so far as today the scope of patent eligible business method - related inventions being patent eligible subject matter under the EPC is broader than that under US patent law. However, this does not mean that the scope of patentable business method - related applications under the EPC

are more likely to be granted patents than under the US patent law because a patentable invention also needs to qualify under the other requirements for patentability in addition to it constituting a patent eligible subject matter.

4.4.2 The comparison on patentable business method - related inventions between US and Europe

The major difference in the requirements for patentability in the US and Europe is that there is a stricter interpretation of inventive step in Europe than the interpretation of nonobviousness in the US. In the US patent system, the examiners must consider whether there are differences between the prior art and claimed invention and whether the differences are nonobviousness to the skilled person.⁵⁷⁵ In the European patent system, the examiners not only need to consider the differences between the prior art and the claimed invention. But more importantly, the examiners also need to decide whether the claimed invention involves a technical contribution and whether the contribution is non-obvious to the skilled the person. This is always assessed using the problem/solution approach. In other words, in Europe the claimed invention must solve a technical problem in a non-obvious way.⁵⁷⁶ Thus, a business method apparatus invention, even if it does not involve any technical contribution, will fulfil the nonobviousness requirement in the US and could be patentable if it is nonobvious for the skilled person in the art to which the said subject matter pertains.⁵⁷⁷ In Europe, only when an invention involves a technical contribution, and the technical contribution is non-obvious for a skilled businessman who also has the knowledge in the relevant technical field, the business

⁵⁷⁵ See Section 4.3, Chapter Four.

⁵⁷⁶ See Section 3.3, Chapter Three.

⁵⁷⁷ See Section 4.3, Chapter Four.

method invention would be regarded as involving inventiveness.⁵⁷⁸ Therefore, when a general purpose physical entity is used to implement a "specific" business method, the "new" apparatus, which is an apparatus invention for implementing "a certain business method", if there are some differences between the prior art and the claimed apparatus invention, the invention is "new"⁵⁷⁹. If the difference is nonobvious for the skilled person in the art to which the claimed subject matter pertains, the claimed invention will be patentable in the US, even if the general purpose apparatus is purely conventional and there is no technical contribution to the apparatus. However, only when the general purpose apparatus is indispensable ("have to"), also the claimed invention solved a technical problem which the closest prior art doesn't solve, and the solution (i.e. using the general purpose apparatus to solve the technical problem) is nonobvious for the skilled businessman with relevant technical knowledge, the apparatus invention is patentable. Furthermore, a skilled businessman with relevant technical knowledge (Europe) obviously has more knowledge than a skilled person who has the knowledge in merely relevant business field or in merely relevant technical field (US). Thus a solution could be non-obvious for a skilled person in the US but is obvious for a skilled person in Europe. Therefore, the scope of patentable business method apparatus in the US is broader than in Europe although in both regions the scope of patent eligible business method apparatus is the same.⁵⁸⁰

⁵⁷⁸ See Section 3.3, Chapter Three.

⁵⁷⁹ In fact, there still have differences in assessing the novelty requirement between Europe and US. The novelty requirement under the EPC, which is absolute novelty, is much more restrictive than under the US regulation. The absolute novelty requirement under the EPC means the invention has not been made available to the public either by written or oral description or in any other way before the priority date of the EP application. Any prior written or oral publication, demonstration or use before filing the patent application, by anybody, anywhere in the world prevents an invention from being patented there. An inventor must keep in mind that any information of the invention which is accessible to the public may destroy the novelty of his own invention. Contrary to that in the United States there exists a one year grace period for protection an inventor or his successor in title from a publication of the invention before the filing date. For a more detailed description about the "grace period" see footnote 327. Thus, if the application is filed after the publication of the invention within a period of one year, one will not get a patent in Europe, however one may still get a patent in the US. However, besides the grace period, the other factors in assessing the novelty requirement between Europe and US are similar. Hence, in this part to compare the scope of patentable business method - related inventions in EU and US, the author will ignore the difference in grace period in the novelty requirement between US and Europe.

⁵⁸⁰ The conclusion is on the ground that the differences in novelty requirement and utility/industrial applicability requirement between the US and Europe are ignored. In fact, the difference between the industrial applicability requirement (Europe) and utility requirement (the US) does exist. When a claimed inventions which could apply solely in the private or personal sphere for one's ownness, or which could be applied solely in association with a particular person, would not meet the industrial

For business method - related process inventions, although the scope of patent – eligibility for such kind of inventions in Europe is broader than the US because the US patent system require a “machine – or – transformation” test in determining patent eligible process inventions, a technical contribution requirement in determining inventive step results the difference seems to be not any repercussions in comparing the scope of patentable business method – related process inventions. The “tied” and “particular” requirement in “to be tied with a particular machine or tangible apparatus”, or “transforming an article from one thing or state to another, means a technical effect has been achieved or a technical problem has been solved. Furthermore, when a technical effect is achieved or a technical problem is solved, such an invention is obviously beyond “abstract idea” since in the US only “an abstract idea, a law of nature or a natural phenomenon” are excluded from patent – eligible subject matter. Thus, when the difference in skilled person between in the US and in Europe is considered in determining nonobviousness / inventive step, i.e. a skilled person in Europe has more knowledge than a skilled person in the US because the European patent law requires skilled person must have knowledge in both the technical fields and the business fields, the scope of patent business method – related process inventions in the US is broader than in Europe.

applicability requirement. However, since business method inventions are used in business field, not used by particular person, hence for business method - related inventions, the utility requirement (the US) should be regarded as to be equal to the industrial applicability requirement (Europe).

Chapter Five: Statistics Analysis of Business Method Patents

Quality

Chapter One indicated that one of the main criticisms of business method patents is based in the fear that they will be of low quality and that there is a risk of possible harm produced by low quality patents. The exclusive right is a necessary evil (which confers the owner of the patent significant market power to control knowledge that is otherwise free for the taking) in return for a public description of the invention and stimulating the technological development. If such exclusive right is granted erroneously to the low quality inventions that should not be issued a patent, the public will not receive the benefit of technological advancement. Therefore, if business method – related inventions (which have been or will be granted patent protections) are of low quality, patenting such type of invention would be erroneously and should be rejected.

A few criticisms asserted that business method inventions are low of quality and hence they are not worth being granted patent protection. These criticisms must be seen as based on unsupported conjectures. Most business method patent abolitionists assume that prior art references are inadequate in assessing the patentability requirements (which are novelty and nonobviousness requirements) of business method – related inventions. This is based on the fact that there may be none or few business method – related inventions granted patents before. The insufficient prior art references may result in low quality business method patents being introduced patent system. However, the conclusion generally is made on the ground that the criticisms cited two well-known examples⁵⁸¹ of business method patents issued by

⁵⁸¹ These two well-known examples are: Amazon.com's patent for its "one-click" purchase technique for improved efficiency in ordering merchandise on line, and Priceline.com's patent for running reverse auctions used in buying airline

the USPTO to exemplify the low quality of such patents. Leaving aside whether these two patents are really of low quality, two examples on their own obviously cannot be a representative sample of whole range of business method patents which have now been issued to thousands of such inventions every year⁵⁸² following the State Street Bank decision (1998) by the USPTO. Some criticisms further suggest that even if there are enough references in the prior art, it is the poor ability of patent examiners which results in their being unable properly to assess the novelty and inventive step/nonobviousness of an invention from an examination of the prior art.⁵⁸³

The question is whether it is true if allowing patenting business method – related inventions such patents would introduce low quality inventions into patent mechanism. To answer the question the author suggests that the following steps should be gone through: (1) we must ask what patent quality is; (2) we shall understand what role patent quality play in determining whether a new type of invention should be granted patent protection; and (3) we need get wise to how we are to assess the patent quality?

5.1 What is patent quality?

Strictly speaking, patent quality is an elusive concept. A patent represents a bargain with society. In return for a temporary monopoly to exploit an invention, the inventor must

tickets on the Internet. See Bagley, M. A., 2001. Internet Business Model Patents: Obvious By Analogy. *Michigan Telecommunication Technology Law Review*, 7, pp. 253-288. In this study Bagley stated Amazon's failure to cite any "bricks and mortar" or "real world business model prior art" in relation to its 1-click patent. And she concluded that "[If] such prior art were routinely considered, patents like '1-click' would be declared 'obvious by analogy.'" See also Gleick, J., 2000. Patently Absurd. *New York Times Magazine*. 12 Mar.. Harbert, T., 2000. Patently Obvious. *Electronic Business Online*. 1 Jul.; Quinter, N., 2001. Business Methods - Patently Obvious? *North American Free Trade & Investment Report*.

⁵⁸² According to the author's search in USPTO Patent Full-Text and Image Database with the keyword "CCL/705/\$" and "ISD/\$/(year)" on February 4, 2013, the number of the business method patents belonged to US Patent Class 705 granted by USPTO in each year between 1999 to 2012 are: 970 (Year: 1999), 1020 (Year: 2000), 818 (Year: 2001), 835 (Year: 2002), 868 (Year: 2003), 900 (Year: 2004), 1356 (Year: 2005), 2119 (Year: 2006), 1937 (Year: 2007), 2525 (Year: 2008), 2936 (Year: 2009), 5260 (Year: 2010), 5471 (2011), 6635 (2012).

⁵⁸³ However, business method patent should not be rejected does not equate with business method patent should be accepted. The author held whether business patent should be accepted should be justified from various aspects, e.g. the relevant law provisions, patent quality and the economic effect of such kind of patents.

disclose the invention's details to the public instead of keeping them secret. To justify whether a new type of invention should be introduced to patent protection, it is needed to prove that the type of invention is worth to do the bargain. However, as Thomas Jefferson (the first Commissioner of the U.S. Patent system and the nation's first patent examiner) pointed, "the difficulty of drawing a line between the thing which are worth to the public the embarrassment of an exclusive patent, and those which are not"⁵⁸⁴. Following the statement of Thomas Jefferson, the US academia in the patent field attempts to find the line that can be used to determine whether an invention is worth to be exchanged with patent protection. Since the whole aim and the end of the patent system is to receive the benefit by the disclosure of patented inventions, to justify this exchange an invention must be shown that its disclosure has sufficient value. The value of patented invention is reflected that it contributes novelty and nonobviousness, which is called "patent quality" in the US.

5.2 What role does patent quality play?

Baron & Delcamp (2010) have stated that: "There is a longstanding tradition in economic research to rely upon patent data to measure the output of innovative activity. Nevertheless, patents are very heterogeneous, as some patents are very important, while many patents are never [even] used. As this heterogeneity of patents reduces the significance of patent counts as measure of innovation output, empirical research routinely weights patent counts by indicators of the importance of the underlying technology. This importance of the underlying technology is referred to as patent quality and could alternatively be defined as the size of the inventive step protected by the patent or as the relevance of the underlying technology for

⁵⁸⁴ Lipscomb, A. A., & Bergh, A. E. (editor), 1905. *The writings of Thomas Jefferson*. Washington, US: Thomas Jefferson Memorial Association. At page 355.

future use by follow-up innovators."⁵⁸⁵ Thus a line, “patent quality”, is drawn to determine whether the disclosure of an invention is sufficiently valuable to be exchanged with an exclusive patent in the US.

5.3 How are we to assess the patent quality?

However, it still lacked an effective way to measure the patent quality. Initially, the US researchers adopted traditional social science research methods like case studies, survey analyses and so forth to assess patent quality. But these methods could only be used to measure one or more specific patent’s social value or quality and are not available for studies of patent quality when patents are grouped by their classification. Thus, the researchers attempted to identify the key factors that reflect patent quality, which is called “patent quality indicators”. Thus, certain indicators of patent quality emerged. The indicators of patent quality are observable characteristics of a patent that are believed to be driven by patent quality.⁵⁸⁶ Through analysis of these indicators, the quality of a very high number of relevant patents can be observed easily. For example, Schankerman and Pakes (1986) used patent renewal data to estimate the value of patent rights and found that adjusting for quality at country level accounted for most of the observed decline in patents per scientist and engineer.⁵⁸⁷ Other important indicators that have been used include the number of patent citations (Trajtenberg, 1990; Hall, Jaffe and Trajtenberg, 1999, Lanjouw & Schankerman, 1999; Rysman & Simcoe, 2008), patent family size (Putnam 1996) and the number of claims in patent applications (Tong and Frame, 1994).⁵⁸⁸

⁵⁸⁵ Baron, J., & Delcamp, H., 2010. Patent Quality and Value in Discrete and Cumulative Innovation. CERN Working Paper No. 2010-07. [Online] Available at <<http://ssrn.com/abstract=1709999>> [Accessed 18 January 2011], at page 5.

⁵⁸⁶ Ibid, at page 4.

⁵⁸⁷ Schankerman, M., & Pakes, A., 1986. Estimates of the Value of Patent Rights in European Countries during the Post-1950 Period. *Economic Journal*, **96**, pp. 1052-1076.

⁵⁸⁸ Trajtenberg, M., 1990. A Penny for Your Quotes: Patent Citations and the Value of Innovation. *Rand Journal of Economic*, **2**(1), pp. 172-187. Hall, B. H., Jaffe, A. B. & Trajtenberg, M., 1999. Market Value and Patent Citations: A First

Baron and Delcamp (2010) systematically summarised six commonly used indicators of patent quality: forward citations, backward citations, number of claims, family size, and originality and generality indices from the economic literature, which are detailed in the following table.⁵⁸⁹

Look. In: NBER Conference, 20th Anniversary of the Productivity and Technical Change Program (Cambridge, MA). LanJouw, J., & Schankerman, M., 1999. The Quality of Ideas: Measuring Innovation with Multiple Indicators. *NBER Working Paper 7345*. Rysman, M., & Simcoe, T., 2008. Patents and the Performance of Voluntary Standard Setting Organizations. *Management Science*, **54**(11), pp. 1920-1934. Putnam, J., 1996. The Value of International Patent Rights. Ph.D. Thesis in Yale University. Tong, X., & Frame, J. D., 1994, Measuring National Technological Performance with Patent Claims Data. *Research Policy*, **23**, pp. 133-141.

⁵⁸⁹ Baron, J., & Delcamp, H., 2010. Patent Quality and Value in Discrete and Cumulative Innovation. CERN Working Paper No. 2010-07. [online] Available at <<http://ssrn.com/abstract=1709999>> [Accessed 18 January 2011]

Name of the Indicator	Description	Justification
Forward cites	Number of citations received by posterior patents	Indicates the relevance of the patent for further research
Backward cites	Number of citations made to previous patents	Indicates the extent to which the patent makes use of the existing prior art
Number of claims	The number of priority claims made in the patent	Indicates the breadth of the technology claimed by the patent holder
Family size	The number of international patents filed for the same priority patent	Indicates that a patent is important on an international scale, and that its holder is willing to incur high applications costs
Generality	Dispersion of cited patents over technology classes	Indicates that the patent draws from various sources, increases the likelihood that the patent is a fundamental rather than incremental innovation
Originality	Dispersion of citing patents over technology classes	Indicates that the patent has been important for a broad field of further research

Table 3 patent quality indicators

These indicators are used separately or blended to capture the phenomena associated with the patents' quality according to the different research purposes under different situations. Turning the attention back to business method patents, the literature has indicated that the assumption that business method patents have low quality is mainly due to their having a lack of sufficient prior art references. But this is alternatively explainable as a product of the relative newness of such patents to assess whether the critical assumption is correct, this chapter will look at backward cites to measure business method patents' quality.

Evidence in various patent litigation studies suggests that uncited prior art - prior art that was not before the patent examiner - is the most common basis for court decisions which invalidate patents⁵⁹⁰. It would seem to follow that the fewer the number of prior art references that there are to support a patent application the less the probability that the patent will be held valid if challenged in court. A larger number of prior art references may point to a more serious effort by the applicant to differentiate his invention from the prior art and perhaps also to a more thorough examination in the patent office, resulting in a stronger patent which is more likely to withstand challenge⁵⁹¹. Thus, there is likely to be a direct correlation between the number of references to prior art and the patent's value. The number of prior art references should relate positively to the resources devoted by the applicant, and possibly also by the patent examiner, to the patenting process, thus supporting an inference of greater patent value. Harhoff et al. (1999) found empirical support for the notion that the number of prior art references is positively correlated to patent value⁵⁹².

⁵⁹⁰ Allison, J. & Lemley, M., 1998. Empirical Evidence on the Validity of Litigated Patents. *American Intellectual Property Law Association Quarterly Journal*, **26** (3), pp. 185-275.

⁵⁹¹ Allison, J. & Lemley, M., 2000. Who's Patenting What? An empirical Exploration of Patent Prosecution. *Vanderbilt Law Review*, **53**(6), pp. 2099-2174.

⁵⁹² Harhoff, D., Scherer, F. M. & Vopel, K., 1999. Citations, Family Size, Opposition and the Value of Patent Rights. [Online] Available at <http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6V77-47C8V84-11Y&_cdi=5835&_user=7165870&_pii=S0048733302001245&_origin=na&_coverDate=09%2F30%2F2003&_sk=999679991&view=

Thus, if the Number of citations which are made to previous patents within the classes of business method patents happens to be the same or more than for general patent classes, then the contribution of business method patents in respect of novelty and inventive step/nonobvious are likely to be at about the same level as with the contribution of general patents. If so, then it would also follow that the criticisms concerning the patent quality on the grounds of inadequate prior art referencing will not be justified.

Also, from the perspective of the cited patents, the occurrence of a patent in later search reports (a "forward citation") will show that the original patented invention was relevant to later inventions. The number of forward patent citations appears to be correlated with the quality of the earlier patents. Carpenter, Narin and Woolf (1981) showed that some technologically important patents had relatively high citation rates⁵⁹³. Thus, if the number of citations received by the class of posterior patents which are cited in later business method patents is at the same level or greater than with the classes of general patents, then it would also appear to follow that the technical importance of business method patents as a class can be regarded as being at about the same level of quality as with general patents', or, in other words, business method patents have the same importance with general patents in respect of their influence on further innovation. Later in this chapter, forward cites will also be used to measure whether the obtaining patentee's exclusive monopoly rights is a useful exchange from the point of view of the patentee which justifies the disclosure of the innovative specification in relation to business method-related inventions.

[c&wchp=dGLbVtz-zSkWA&md5=22c14dc66ff53e7dd0d95bbb35b530b7&ie=/sdarticle.pdf](#) [Accessed 6 July 2010]
⁵⁹³ Carpenter, M.P., Narin, F. & Woolf, P., 1981. Citation Rates to Technologically Important Patents. *World Patent Information*, 3(4), pp. 160-163.

To test the criticism that the USPTO has accepted too many low quality business method patents since 1999, the empirical statistical citations data of the USPTO will be analysed in this chapter and conclusion drawn therefrom which will then be used to formulate the policy stance which the author believes should be taken with regard to the future of business method patenting in the EPO. This study looks primarily at qualitative and quantitative data gleaned from patent applications rather than analysing the quality of the information provided in the individual patent applications themselves which task would be too vast to undertake within the time constraints of a PhD research studentship. The total number of patent and non-patent prior art references collected do not tell us anything about the quality and relevance of the references for any particular patent specification nor how well differentiated the expression of the claims contained therein are from the relevant prior art. However, they do appear to provide a qualitative measure of patent quality of the classes of business method related patents as a whole at least as compared to the same data for general classes and provided they are useful and cautiously used in conjunction with other indices of quality.

5.4 Statistics analysis of prior art (Backward Cites)

5.4.1 Comparison of patent references as between Business Method Patents and General Patent in U.S. (1999-2009)

Table 4 Means of Patent References: Business Method Patents compared with General Patent

Group Statistics

		N	Mean	Std. Deviation	Std. Error
Patent References	BMP	1495	21.4127	38.33266	.99140
	GP	1356	17.5619	37.12814	1.00826

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	3.802	.051	2.719	2849	.007	3.85076	1.41623	1.07383	6.62769
Equal variances not assumed			2.723	2836.743	.007	3.85076	1.41402	1.07814	6.62338

From table 4 we can find that the mean value⁵⁹⁴ of the number of patent references on the 1495 random samples of business method patents is 21.41, with a standard deviation⁵⁹⁵ of 38.33 patent references, which is bigger than that of 17.56 for the mean value of the number of patent references, with a standard deviation of 37.12 patent references, on the 1356 random samples of general patents. The result shows that selected business method patents on

⁵⁹⁴ The mean is arithmetic average of a group of scores; sum of the scores divided by the number of scores. It is the most common measure of central tendency. See Aron, A., Aron, E. N. & Coups, E. J. (2008) Statistics for the Behavioral and Social Sciences: A Brief Course. 4th ed. U.S.: Pearson Education, Inc at page 460.

⁵⁹⁵ The standard deviation is square root of the average of the squared deviations from the mean. It is the most common measure of dispersion, which shows how spread the scores are around the mean. See Sarantakos, S. (2007) A Toolkit for Quantitative Data Analysis: Using SPSS. U.S.: Palgrave Macmillan. At page 43.

average have more patent references per patent than selected general patents. However, can this characteristic be applied to the population (i.e. the entire business method patents and the entire general patents). Thus, we need estimate it with the assistance of significance⁵⁹⁶ tests. In the second table of table 4 the significance (p value) of Levene's test is 0.051, which is larger than the significance level of 0.05. Consequently, we need look at the two-tailed significance (two-tailed p value) in the first row (labelled "Equal variances assumed ") of the second table in table 4. The two-tailed significance level of 0.007, which is less than 0.05, shows that there is a significant difference in the mean values of the number of patent references between entire business method patents and entire general patents. Based on the independent samples t-test statistics analysis, we can conclude that business method patents on average have had significantly more patent references per patent than general patents have had since 1999.

5.4.2 Non-Patent references' means comparison between Business Method Patents and General Patent in U.S. (1999-2009)

⁵⁹⁶ Statistical significance is the probability that a test result has occurred by chance or error. In practice, this probability is expressed in significance levels and researchers testing the significance of their results work within a level (typically, the level is 0.05). See Sarantakos, S. (2007) *A Toolkit for Quantitative Data Analysis: Using SPSS*. US: Palgrave Macmillan Ltd. P63.

Table 5 Means of Non-Patent References: Business Method Patents compared with General Patent

Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Non-Patent	BMP	1495	12.2669	36.04815	.93231
References	GP	1356	3.8201	13.73986	.37312

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	69.210	.000	8.111	2849	.000	8.44683	1.04145	6.40476	10.48890
Equal variances not assumed			8.411	1955.599	.000	8.44683	1.00421	6.47740	10.41626

Table 5 shows that the mean value of the number of non-patent references on the 1495 random samples of business method patents is 12.27, which is higher than that of 3.82 for the mean value of the number of non-patent references on the 1356 random samples of general patents. The Levene’s Test for Equality of Variances indicates that the value under “Sig.” is 0.000 (less than 0.05) which implies that we should use the bottom row of the output in the second table of table 5 (the row labelled “Equal variances not assumed”). The two-tailed significance level is 0.000 and less than 0.05, which means there is a significant difference in the mean values of the number of non-patent references between business method patents and

general patents. Thus, based on the descriptive statistics of table 5 the significant difference is that on average business method patents have had significant more non-patent than general patent have had since 1999.

5.4.3 Total “prior art” references’ means comparison between Business Method Patents and General Patent in U.S. (1999-2009)

Table 6 Means of Total “prior art” References: Business Method Patents compared with General Patent

Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Total References BMP	1495	33.6796	64.71305	1.67368
GP	1356	21.3820	45.32178	1.23077

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	26.911	.000	5.822	2849	.000	12.29759	2.11242	8.15556	1.6439E1
Equal variances not assumed			5.919	2681.965	.000	12.29759	2.07750	8.22394	1.6371E1

The descriptive statistics of table 6 indicates that the mean number of total “prior art” references (patent references and non-patent references) on the 1495 random samples of

business method patents is 33.68, which is bigger than the mean number of total “prior art” references on the 1356 random samples of general patents, which is 21.38. The significance value of Levene’s test is 0.000, which is less than the significance level of 0.05. The two-tailed significance in “Equal variances not assumed” row is 0.000. Therefore, the number of total “prior art” references cited by business method patents is significantly different with the number of total “prior art” references cited by general patents. According to the descriptive statistics of table 6 we can conclude that on average business method patents have had significantly more total “prior art” references per patent than general patents have had since 1999.

5.4.4 The comparison of median and mode for patent references, non-patent references and total references in U.S. (1999-2009)

Table 7 The comparison of median and mode Prior Art References in U.S. between business method patents and general patents

		Patent References	Non-Patent References	Total References
Median	BMP	12	4	18
	GP	10	0	11
Mode	BMP	6	1	12
	GP	8	0	8

Although the mean is the best measure of the representative value of a group of scores,

considering the disadvantage of mean in statistics, which is that it can be affected by extreme values⁵⁹⁷, this section will use the other two representative values (mode and media) to measure whether the number of backward citations for business method patents classes generally are more than the number of backward citations for general patents and further to estimate the quality of business method patents more accurately.

Median is the middle score when all the scores in a distribution are arranged from highest to lowest⁵⁹⁸, which is a better measurement as a representative value for a group of scores than the mean when there are a few extreme scores that would strongly affect the mean⁵⁹⁹. Table 7 shows the median values on the number of business method patents' patent references, the number of business method patents' non-patent references as well as the number of business method patents' total "prior art" references are all higher than the number occurring in related to general patents. This means that even if the random selected samples could have a few extreme scores in the number of backward citations and affect the mean value, the actual mean on the number of patent references (as well as non-patent references and total "prior art" references) in entire business method patents is most likely higher than the mean number occurring in relation general patents. This proved the results from the above comparisons (in Section 5.1.1, 5.1.2, 5.1.3) are random variable.

Mode is the value with the greatest frequency in a distribution⁶⁰⁰. Table 7 indicates that both of the mode value on the number of randomly selected business method patents' non-patent references and the mode value on the number of randomly selected business method patents' total "prior art" references are higher than for general patents, which shows the situation,

⁵⁹⁷ Triola, M. F. (1989) Elementary Statistics. 4th ed. US: Benjamin/Cummings Pub. At page 67.

⁵⁹⁸ Aron, A., Aron, E. N. & Coups, E. J. (2008) Statistics for the Behavioral and Social Sciences: A Brief Course. 4th ed. U.S.: Pearson Education, Inc. at page 458.

⁵⁹⁹ Ibid. at page 38.

⁶⁰⁰ Ibid. at page 458.

(which is that business method patents cited more non-patent references and total “prior art” references), occurred frequently. Interestingly, table 7 also shows that the mode value on the number of randomly selected business method patents’ patent references is lower than the mode value on the number of randomly selected general patents’ patent references. This seems to imply that general patents cited more patent references than business method patents. However, considering the situation which is that most of business method patents were applied for and issued after 1999, it is reasonable to believe that following more and more business method patents are granted the situation could be overturned.

5.4.5. Summary

With a confidence level of over 99% in the case of total references ($p < 0.0001$), non-patent references ($P < 0.0001$) and patent references ($p < 0.007$), on average business method patents had significantly more prior art references than general patents had in the USPTO’s patent examination between 1999 and 2009. To prevent the possibility arising that some patent applications cite a large unexpectedly number of prior art references, which would result in the comparison of means being unreliable, the author has also compared the median number and mode number of prior art references in the two datasets used in the research. The consistency of statistical outcomes shows that extremely large numbers of references did not skew the findings.

The findings indicate that business method patents in general cite significantly more prior art references than do general patents since 1999. A conclusion may therefore be drawn from the findings, to the effect that the prior art database was sufficient for business method patents. There therefore appears to be no evidence which supports empirically the criticism that

business method patents were of inferior quality or of lower value than for most general patents. Hence, the criticism, which stated that business method is not an appropriate subject matter for patent protection, are not justifiable.

5.5 Statistical analysis of times a prior patent is cited in subsequent patent (Forward Cities)

Table 8 The comparison of times to be referenced by subsequent patents between business method patents and general patents

	N	Mean	Median	Mode
BMP	999	30.85 (p=0.000<0.05)	15	1
GP	915	6.89 (p=0.000<0.05)	3	0

The comparison in table 8 shows that between 1999 to 2005 on average a business method patent was cited more frequently by the latter patents than is the case for a general patent.

It is not possible to confirm the real reason within 1999 to 2005 why, on average, business method patents were cited more frequently in subsequent patents than the comparable average number of citations in respect of general patents. One reason may be that the number of business method patents is lower than the number of patents in other fields, perhaps because most of the business method patents were applied for after 1999. So a business

method patent may be cited frequently as a patent reference by the latter patents. Another reason may be that business method patents are more valuable to the inventors. However, whatever the reason, these findings indicates that disclosure of inventions under the patent system are helpful to society as a whole.

5.6 Summary

The above analyses show there is no evidence to support the idea that business method patents were low quality. The US experience in patenting business method – related inventions has indicated that patented business method – related inventions have same value as patented general inventions in return for disclosure of their specifications to the public. In other words patented business method – related inventions can contribute same novelty and nonobviousness/inventive step as patented general inventions. Referring to the findings, this seems mean that accepting business method patents in Europe would not result in inferior inventions being introduced in the European patent system. Furthermore, the analysis of the relevant provisions and decisions has proved that in Europe a patentable business method – related invention, although it is generally called business method patent, is a physical entity patent or a process patent with technical character. The term “business” in such a kind of invention only is used to implicate the invention’s function. To be patented such an invention must make a technical contribution or have a technical effect. This seems also to imply that such types of patents would not produce a lesser inventive step and result in the European patent system introducing inferior quality inventions. On the contrary, accepting business method patents and the resulting disclosure of these patents’ specifications would bring benefits to subsequent inventors and to the public.

Chapter Six: The Economics of the Patent System with Particular Reference to Business Method Inventions

Patents are not a recent creation. In the Middle Ages patents had already clearly entered the legal sphere as an economic mechanism was to attract foreign craftsmen, encourage innovation, promote new technologies, and develop industries etc.⁶⁰¹ However, considering economic appreciation and analysis of them is a relatively modern phenomenon. Originating in the U.S., the economic evaluation of patents (or intellectual property) has spread across Europe. Guellec & Potterie (2007) have stated that "the economic role of patents is probably more important than ever before"⁶⁰². The EPO has concluded that the increasing number of patent applications⁶⁰³ is due "in part, to individual inventors, SMEs, large companies and research institutions realising the importance and economic impact of patenting their innovations."⁶⁰⁴ This chapter will attempt to use some of these economic theories and the results of our empirical study of the economic impacts of general patents in the real world, which was concluded in Chapter one⁶⁰⁵, applying them to show whether business method patents should be more readily utilised by the EPO once the economic impact of patents (IP) is properly evaluated.

The emphasis in this chapter is to compare and contrast the economic impact as between general patents and business method – related patents. This will be achieved by using

⁶⁰¹ See Section 1.4.5, Chapter One of this thesis.

⁶⁰² Guellec, D., & Potterie, B. P., 2007. *The Economics of the European Patent System*. Oxford: Oxford University Press, at page 1.

⁶⁰³ Between 1992 and 2001, the number of patent applications filed in Europe, Japan and the United States grew by more than 40 percent. The number of patents filed with the European Patent Office reflects that trend, going from approximately 100,000 applications in 1997 to nearly 193,000 in 2005. See European Patent Office, 2010. The Economic Importance of Patents. [online] Available at <<http://www.epo.org/topics/innovation-and-economy/economic-impact.html>> [accessed 15 January 2011].

⁶⁰⁴ European Patent Office, 2010. The Economic Importance of Patents. [online] Available at <<http://www.epo.org/topics/innovation-and-economy/economic-impact.html>> [accessed 15 January 2011].

⁶⁰⁵ See Section 1.5 and 1.6, Chapter One of this thesis.

empirical data to find out whether business method – related patents are likely (as some have suggested) to result more harm to the economy than general patents have. If the answer is no, then it is reasonable to grant business method – related patents more easily in Europe.

To evaluate what impact may be generated if the EPO allowed (or alternatively disallowed) business method patent protections, two main sources of literature will be used in this Chapter: (1) the UKIPO's consultation (2000) and (2) the work of Hart and Pitkethly (2003). In autumn 2000, the UK patent Office carried out a consultation, which was entitled "Should Patents Be Granted for Computer Software or ways of Doing Business". The UKIPO received 284 responses to the invitation to submit. They comprised 239 individuals, and 45 organisations (companies, trade and professional bodies, and so on)⁶⁰⁶. With the help of UKIPO's administrator, the author obtained all original responses in this consultation and used them as a main source to conduct the literature survey in this thesis. Due to the problems of designing and reporting the consultation and to the fact that the respondents had little or no experience of the US position on patenting business methods, Hart & Pitkethly (2003) conducted a study to further investigate the effect of business method patents and hoped to find evidence to support the proposition that patenting business method inventions should be adopted by Europe⁶⁰⁷. Mr. Robert Hart (independent IP consultant) and Dr Robert Pitkethly (St Peter's College, Oxford and the Said Business School, Oxford) formed a research team and worked with the IP Institute (London) to complete a highly important report entitled "Business Implications of Business Method Patents" which comprised three studies on the business implications of business method patents carried out between 2001 and 2003. These studies involved: US Business Method Patents, Venture Capital and Business Method Patents in the UK, and US Infringement risks for UK companies. The report was submitted to the IP

⁶⁰⁶ UK Patent Office, 2000. Should Patents Be Granted for Computer Software or Ways of Doing Business? The Governments Conclusions.

⁶⁰⁷ Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute, at page 5.

Institute in August 2003 and was welcomed by the UK and European Patent Offices as a significant contribution to policy development in business method patents. As the purpose of this chapter is to evaluate the economic impact of business method patents, this heading will concentrate upon the findings relating to the economic impact of patenting business methods as analysed within these two studies. The data from other literature will be considered for complementing the findings.

6.1 Protecting the returns of R&D

Due to the intangibility of the information specified in inventions, once the invented product is introduced into the market its underlying specification will unavoidably be disclosed. Thus, the invention is able to be copied and misused by imitators who did not share in the original R & D investment. These imitator competitors are able to sell the invention at a lower price than the price which the potential users would have been willing to pay the original inventor. In this case, the inventor may be unable to appropriate enough of the social value of the invention to justify the initial R & D expenditure. In an extreme situation, the price may even decrease to the marginal costs of production. At this price the inventor recovers manufacturing costs but receives no return on the original R & D investment. As a result the inventor's incentive to invent disappears. This, in turn may lead to under-investment in further technological research. This is even more likely to occur when high risks are involved in research activity. Thus, socially valuable inventions might not occur or at the very least be significantly delayed.⁶⁰⁸

It is undoubted that patents which are granted a business method inventor monopoly, are

⁶⁰⁸ Eisenberge, R., 2000. Patent and Progress of Science: Exclusive Rights and Experimental Use. *University of Chicago Law Review*, **56**, pp. 1017-1086.

helpful to protect the return of the inventor's R & D expenditure. However, we need to consider further whether the return of the inventor's R & D expenditure on business method inventions necessitates that the inventions are protected by patent system. In other words, where business method related inventions cannot be patented, does the inventor's incentive to invent decrease? Or are other alternative incentives enough to stimulate investment in business method related inventions?

With regard to the business method related industry, it seems that it may not often be worthwhile using patents to recover an inventor's R & D investment costs. The cost of initial investment in R&D for business methods possibly may be low. This has been indicated by the fact that there were few responses to UKPO's consultation (2000). So, it seems that the first in the market advantage ("i.e. the "head start" advantage) and other possible advantages gained through the use of business method - related inventions may be enough to justify the expenditure on R & D to produce business method - related inventions. Patenting business method – related inventions to protecting the returns of the inventors' R & D expenditure may simply not be necessary. However, the lower initial cost of business method inventions when compared with the average initial cost of general patentable inventions does not necessarily prove that patent protection is redundant. It cannot be necessarily inferred from the statistical evidence denied from the UKPO's consultation. Indeed, it is difficult to find statistical data on the costs of investing business method - related inventions. Business method - related inventions are concentrated in the service industry. There is a fundamental difference as between the composition of R & D in manufacturing and services and this has implications for its measurement.⁶⁰⁹ Manufacturing R & D typically involves developing improved materials, designs, or processes and such activities are very likely to fall under the official

⁶⁰⁹ Gallaher, M., Link, A., & Petrusa, J., 2005. Measuring Service Sector Research and Development. [Online] Available at <<http://www.nist.gov/director/planning/upload/report05-1.pdf>> [Accessed 28 September 2010]

definition of R & D used by statistical agencies. In services, however, improving products or processes often involves purchasing components from manufacturing firms, integrating these into existing systems, and finding the most efficient way to manage the systems and so to provide benefits to customers.⁶¹⁰ Hunt (2010) used an alternative approach, and attempted to identify the R & D investment in the US financial industry.⁶¹¹ In his study, he measured the R & D workforce instead of the R & D costs in financial services due to the fact that “80% of R & D costs in this sector consists of wages and fringe benefits”⁶¹². He found “about 3.2 million potential research workers in all industries and about 147,000 in financial services”⁶¹³. However, Hunt also stated that of the 147,000 research workers, two thirds of them were computer programmers or software engineers. Therefore, this seems to show that R & D costs in the financial service industry are similar to the R & D costs in the software industry⁶¹⁴. But when the products of these two industries are considered, R & D investment in software was more common than in the financial service industry it was found that the proportion of R & D costs in the overall costs in the financial service industry would be lower with business method R & D than development R & D is in the software industry. Therefore, this provides reasonable support for the findings of the UKPO’s consultation (2000), which is that the cost on initial investment in R&D of business methods possibly is low⁶¹⁵.

⁶¹⁰ Ibid.

⁶¹¹ Hunt, R. M., 2010. Business Method Patent and U.S. Financial Services. *Contemporary Economic Policy*, **28**, pp. 322-352.

⁶¹² Ibid. at page 347

⁶¹³ Ibid. In Hunt’s paper, he also stated “the occupational composition of those workers in the financial sector is quite different from that for all industries. In financial services, nearly two-thirds of these workers are computer programmers or software engineers, but other engineers are extremely scarce”.

⁶¹⁴ The study of Bessen and Hunt (2007) also indicated that four of five business method patents are software patents. See Bessen, J. and Hunt, R. M., 2007. An Empirical Look at Software Patents. *Journal of Economics and Management Strategy*, **16** (1), pp. 157-189.

⁶¹⁵ Using the business method – related patents in financial service industry to represent all the business method – related patents may result in some errors in the research. However, the errors would be minimum because at least in US the inventions in the financial industry is one main component of business method – related patents since the US patent class 705, which is the majority of US business method patents, is entitled with “Data Processing: Financial, Business Practice, Management, or Cost/Price Determination”. The low cost of R&D in financial service industry has been proved by NSF data for 2003. The data show that for every dollar of R&D spent per full-time researcher in all industries, financial firms spent less than 40 cents. See Hunt, R. M., 2010. Business Method Patent and U.S. Financial Services. *Contemporary Economic Policy*, **28**, pp. 322-352.

In addition, the patent system makes it necessary to invest a great amount of money, time, effort and expertise in obtaining patent applications, which can be a particularly serious burden for SMEs and so inherently favours large companies⁶¹⁶. At the same time, the R & D and patenting costs have put up the price of business method related products and thus damages the interests of the public and the consumer. When we consider the expenditure in obtaining patent applications we see that this does not amount to evidence for rejecting the patent protections for business method - related inventions because for general patents such expenditure also exists. The principle problem for obtaining patent for business methods is that this type of patent involves a higher litigation rate than for any other type of patents. Lerner (2008) found that grants of the business method - related patents issued in the US financial services industry were being litigated at a rate 27 to 39 times greater than that of patents as a whole in the same period.⁶¹⁷ Such a high litigation rate may result from the fact that there may be little advancement over the prior art involved in patenting business method - related inventions. Lerner's study showed that the rate of business method - related patents being litigated in smaller, private entities is lower probably because the patents are of a higher quality. This seems to mean that if the quality of business method - related inventions were improved then it would be possible that the litigation rate in business method - related patents would be the same as the rate for general patents.

6.2 Increasing the diffusion of the knowledge

In exchange for exclusive rights over inventions, patent-holders are required to disclose their protected inventions to the public so as to allow an effective diffusion of knowledge. This exchange is often referred to as a bargain between inventors and the State and it is in fact an

⁶¹⁶ The opinion was held by 11 individual responses and 2 organisational responses of UKIPO's consultation (2000)

⁶¹⁷ Lerner, J., 2008. The Litigation of Financial Innovations. [Online] Available at <<http://www.people.hbs.edu/jlerner/FinPatLit.09222009.pdf>> [Accessed 15 July 2010].

inherent feature of the dual nature of patents. Thus, patent protection increases the diffusion of the knowledge that would otherwise be kept secret, which in turn reduces the subsequent innovators' innovation costs. However, the respondents to the UKPO's consultation (2000) stated that the initial cost of business method innovation was low and the level of technology in the innovation was poor and so there was little value in granting patents for such innovations.⁶¹⁸ Also, some respondents indicated that business methods are more likely to be manifested in public and so they are difficult to keep as secrets. Therefore, it seems that the basis of the "patent bargain" does not work so well with this type of invention⁶¹⁹.

However, at least in Europe, under the current patentability requirements for business method related inventions the "technical character" and "technical contribution" criteria⁶²⁰ imply that in general patentable business method – related inventions shall have similar level of technology comparing with the other patentable inventions. Therefore, it is reasonable to believe some of respondents replied the UKPO's consultation (2000) on the premise that they have an ambiguous understanding to what business method patents are. Furthermore, the opponents for business method patents do not deny the value of business method – related inventions' specifications for subsequent inventions, which also is proved again by the statistical analysis in my thesis⁶²¹. They just implicate most of such inventions are difficult to keep as secrets and when these inventions are used such inventions are easily to be understood and to be imitated even if the inventors do not disclose these inventions' specifications. The question is whether it is true that patentable business method - related inventions are difficult to keep as secrets since the "technological character" and "technological contribution" are existing in such kind of inventions. Also, although the R &

⁶¹⁸ The opinion was held by 2 individual responses and 1 organisational responses of UKPO's consultation (2000)

⁶¹⁹ The opinion was held by 2 individual responses and 2 organisational responses of UKPO's consultation (2000)

⁶²⁰ See Chapter Two.

⁶²¹ Section 5.2, Chapter Five.

D cost of business method –related inventions may be at a low level we still need to doubt whether it is true that subsequent inventors are willing to expend R & D costs in similar inventions rather than using the existing patented business method related – inventions through getting licenses from patentees.

6.3 Attracting venture investment

As technology has been seen as one of the engines for dramatic economic growth and productivity, Intellectual Property, especially patents, have been regarded as a niche in which investors could place their investment resources. Patents are an integral part of value creation in technology - based enterprises and as such are a critical element in obtaining venture capital for SMEs. Whether patenting business methods will be effective in encouraging investment into business method based businesses and thus into business methods remains a moot question. Will business method patents also help to raise venture capital for new and expanding businesses? If the answer is "yes" to these questions, it will provide support for adopting protections for patenting business methods because prospective venture capital will then stimulate SMEs to invest in R&D for business method inventions and result in more related inventions being produced. Thus, extending the scope of patentable subject matter to business method inventions could be justified based on the theory of patent incentive investment. However, the results of the study by Hart and Pitkethly (2003) show that this conclusion is not supported by the available evidence⁶²².

Hart & Pitkethly (2003)⁶²³ consulted the UK venture capital industry through using a web survey to ask about the effect on investment attractiveness of the possession of business

⁶²² Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute.

⁶²³ Ibid.

method patents. By analysing 113 available replies, which were from the UK Business Angel related companies and UK Venture Capital companies, the authors found IPRs and Patents and Patent applications to have a positive, though not dominant, role to play in increasing the attractiveness of **technical** investments. However, for non-technical business method patents, the authors formed a different conclusion. According to the authors' concepts of business method patents, following to the practice of US, business method patents should be divided into (1) technical business method patents and (2) non-technical ones. "At present patents can be granted in the USA for all new and inventive business methods including non-technical ones (e.g. a method of running a mutual investment fund) whilst in the UK & Europe inventions must involve some form of technical effect to be patentable".⁶²⁴ Technical business method patents play the same role in increasing the attractiveness of investments as other UK patents. However, if UK keeps pace with US in patenting business methods more generally, which would mean including non-technical business method patents in UK, then, the effect of the introduction of BMPs would be certain not to have any great effect and would most likely therefore have very little effect on investment decisions in any non-technical fields involved.

6.4 Defending competitive advantage

Patents reduce a company's risk of losing control over its core technology, and allow the company to operate from a position of strength in licensing and settlement negotiations. With regard to the business method innovations' high imitation possibility feature⁶²⁵, the respondents of UKIPO's consultation (2000) held different opinions for the effects of business method patents in defending competitive advantage. A few respondents held that patenting business methods would generate a positive impact for SMEs. Business method patents will

⁶²⁴ Ibid.

⁶²⁵ In UKIPO's consultation (2000) total 76 responses mentioned the high imitation possibility risk of business methods.

help SMEs protect their good ideas. These supporters suggested that large companies would need deeper pockets in order to "highjack" small firms' ideas if small firms were able to patent their business methods.

However, within a total of 285 responses only two individual responses mentioned this view. More respondents held that business method patents would have a negative effect in keeping a firm's advantage. When a business method feature that is easy to imitate is considered, allowing the copying of the business method would cause a firm to be motivated continually to seek ever improved business methods and so to regain their competitive advantage⁶²⁶. A strong possibility of imitation would make a firm's competitors hunt for alternative ways of doing business. In this situation, if business method innovation could be patented and so prevent imitation the firm may prefer to rely on their present patented method and so would have the effect of reducing further innovation.

6.5 Macro-economic impact

Shengqiang and Haiyan (2010)⁶²⁷ applied a new classical analysing framework to analyse the influence of business methods and concluded that business methods should be protected by patent. However when we review the literature carefully, we only find on macro-economic impact, which is that: business methods "reduce transaction costs and enhance labor division through which every party may get better paid than in a self-sufficient economy ... when technology develops to a relatively high level, transaction costs resulting from business methods can obviously increase welfare through labor division enhancements"⁶²⁸. However,

⁶²⁶ The opinion was held by 34 individual responses and 6 organisational responses of UKIPO's consultation (2000).

⁶²⁷ Shengqiang, L., & Haiyan, Z., 2010. Economic Analysis of E-business Method Patent. In: IC4E '10 Proceedings of the 2010 International Conference on e-Education, e-Business, e-Management and e-Learning

⁶²⁸ Ibid.

this is not a valid evidence to support that it necessary to protect business methods through using the patent system. Based on Shengqiang and Haiyan's analyses in their study, we can only conclude that the development of business method will bring more welfare and so that the policy makers should make appropriate approach to stimulate more business method inventions. However, this does not mean the incentive must be produced by patent protections. Considering the US position which has explicitly accepted business method patents, if the number of business method - related inventions increased significantly since 1998, this will address the US welfare will be increased through patenting business method - related inventions. Thus, if Europe rejected business method patent and so hindered the increase of business method – related inventions this would result in the loss of region welfare. Unfortunately, (at least) before 1998 most of business method - related inventions were kept as secrets, we cannot conclude the number of business method - related inventions has significantly increased since the US explicitly allowed business method patents although the number of business method patents has increased significantly. However, the growth in the number of business method patents shows us that more and more people are paying attention to the business method - related inventions. More attention may result in the development of business method - related inventions.

In addition, as section 2 of this chapter stated, in a high imitation possibility field, the enhancement of patent protection in a country will result in the growth in import of the new innovation and increase FDI of the country. Considering the US position, if Europe does not accept business method patents, the US market may make more attractive to FDI. While if Europe allows business method patents, this may attract more FDI, at the very least the difference in patenting business method – related inventions between in the US and in Europe would not influence the executives' decisions in choosing their investment place. Thus it

seems that allowing business method patents in Europe is reasonable.

Especially, with regard to the current implications of the existence of business method patents in the US, the possible infringement risk of the European firms in the US gives a valid evidence to support Europe to adopt business method patent. Hart and Pitkethly (2003) found that "the UK firms⁶²⁹ might, even if UK business method patents were unobtainable, be subject to action for infringement of US business method patents where internet related inventions are used by US customers accessing UK servers"⁶³⁰ in the interview with the US interested parties to discuss whether the UK should follow the step of the US in patenting business method inventions. Based on the finding, Hart and Pitkethly studied the relevant patent infringement provisions in the US⁶³¹ with an important character of business methods practice. Hart and Pitkethly (2003) indicated that "E-business transactions involve several parties interacting sequentially and electronically at different terminals or work stations"⁶³². These different terminals or work stations may be located in different countries and connected through the Internet or by some other Information technology. Thus, when a European Server operator provides a service to US clients and an US patented business method invention is used in this process without the patentee's authority, infringement risks may occur for the European Server operator because in fact the European Server operator imports into the United States or offers to sell, sells or uses within the United States a product

⁶²⁹ This opinion would also be true for the whole of Europe.

⁶³⁰ Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute.

⁶³¹ The relevant patent infringement provisions in the US used by Hart & Pitkethly in their research are 35 U.S.C. Section 271 (a) (b) (c) (g). 35 U.S.C. Section 271 (a) which provides "Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent." 35 U.S.C. Section 271 (b) provides: "Whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. Section 271 (c) read as follows: "Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination, or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." 35 U.S.C. 271 (g) which read as follows "whoever without authority imports into the United States or offers to sell, sells, or uses within the United States a product which is made by a process patented in the United States shall be liable as an infringer, if the importation, offer to sell, sale or use of the product occurs during the term of such process patent"

⁶³² Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute.

which is made by a process patented in the United States without authority.

Through analysis of the relevant publications in the US⁶³³, the authors in their paper indicated two different kinds of infringement liability that the European Service providers could take on. If a relevant US patented business method is established by a European Service provider's client without authority and part of terminals is located in the US, the client will be a direct infringer and the European Service provider will be identified as an indirect infringer when the provider knows that some of the terminals will be located in the US. If a relevant US patented business method is established by Service providers themselves without authority and any of the terminals are located in the US, the service providers will be identified as direct infringers. Based on these findings the authors concluded: "US Business Method Patents including claims to the product of the method or process, claims to the server or business method provider and the client or end user, as well as to the data signal executing the process, may expose European Business Method on-line service providers to infringement risks in the United States Courts. This risk is considerably heightened if the US Courts consider ... that the offshore service provider's system constitutes a 'substantial portion' of the system used in the United States by clients of the European Service Provider"⁶³⁴. The infringement risk for the whole European Service Provider industry would impact upon the US market development. "The lack of corresponding protection for Business Methods in Europe may put the European Service Provider at a severe disadvantage when negotiating with US Business Patent holders, particularly if the European business does not protect its

⁶³³ These publications included: Wegner, H. C., 2001. E-Business Patent Infringement - Quest for a Direct Infringement C. A paper prepared for SOFTIC 2001 Symposium. Kiklis, M. L., & Nethery, J. F., 2002. Business Method Patents - Strategic Claiming for Business Method Inventions. A presentation in Washington. Siber, Victor; Kincart, Joseph 2001. The Application of the Process Patent Act as it Relates to Computer-implemented Processes, IP Worldwide. Connor, M. S., & Leak, F. W., 2002. Challenges of Business Method Patent Enforcement – extraterritoriality. *The Computer and Internet Lawyer*, **19**, no. 8: 1-4.

⁶³⁴ Hart, R., & Pitkethly, R., 2003. *Business Implications of Business Method Patents*. London: Intellectual Property Institute.

business methods as such in the United States"⁶³⁵. The disadvantage is that European Companies “[will] not afford to ignore US patents concerning on-line business methods where they have US customers”⁶³⁶. Thus, if Europe cannot keep pace with the US with regard to business method patents, the European Service Providers and other on-line business will be disadvantaged in competing in the US market because these providers are less likely to aware those business methods that has been practiced in the process could have been granted patents since in the locality (i.e. Europe) these methods cannot be patented.

Related to the lack of awareness in business method patents by European companies if Europe cannot keep pace with the US, Hart and Pitkethly (2003) also stated that European creators of new business methods may miss the opportunity to apply patent for their new methods in the US while their US competitors are doing by building up a US patent portfolio. Thus, these European companies can be losing their competitive advantages in the US market compared to their US competitors.

6.6 Summary: Whether Europe should allow business method patents based on the classical justification of patent protection when the impacts of business method patents are considered

Nobody can deny that business method – related innovations are the product of human intellectual labour. Thus, if only on the ground of the moral justification theory, the “natural law thesis”, business method – related inventions should be protected by patents. However, as section 6.1 has stated, the natural law thesis has huge limitations in justifying patentability and the theory gets little support. The economic justifications are the main basis from which

⁶³⁵ Ibid.

⁶³⁶ Ibid.

to assess whether the patent system should accept a new category of inventions as patentable subject matter.

In both the reward – by – monopoly thesis and the exchange – for - secrets thesis, two of the main classical economic justifications for patentability, a basic assumption is that the initial costs of research and development for inventions is at a high level. In the reward – by – monopoly thesis, society needs to reward monopoly rights to the inventors in order to recover the high costs of innovation since the inventions are useful to society as a whole. In the exchange – for – secrets thesis, society gives monopoly rights to inventors in return for the disclosure of the innovative knowledge which could otherwise be kept as a trade secret by the inventors. Disclosure would reduce subsequent innovators' innovation costs, which would be helpful in the inventive processes of society.

When comparing general patentable inventions with business method inventions, the initial R & D costs of the business method – related inventions is lower than for the general patentable inventions. However, low costs do not mean it is not necessary to reward a patent right in order to cover the costs. One issue remaining is whether the revenue created for the business by means of a business method – related invention (e.g. first mover advantage, lead time advantage etc.) is of itself enough to recover the R & D costs. Thus, patenting business method – related inventions may not be justified as an essential protection based on the reward – by – monopoly thesis.

The revenue for the business created by business method – related inventions may also give enough incentive to inventors.⁶³⁷ For example, once a firm locks in users or creates a

⁶³⁷ Pollack, M., 2002. The Multiple Unconstitutionality of Business Method Patents; Common Sense, Congressional Consideration, and Constitutional History. *Rutgers Computer & Technology Law Journal*, **28**, pp. 61-120.

substantial network through using a new business method innovation, it becomes significantly more difficult for rival business to compete.⁶³⁸ The existence of such initial advantages has been enough to stimulate the inventive process for business method – related innovations. Also the empirical study conducted by Hunt (2008), which stated that business method patents have little visible effect in the increase of business method innovations within a company, which has produced business method related innovations, in the US financial service industry⁶³⁹, seems to give strong evidence to illustrate that it seems not to be necessary to provide an incentive to business method inventors through issuing patent monopoly rights. However, the fact is that in the US, the number of business method patents has grown rapidly since the USPTO opened the door for business method patents in 1999. The number of business method patents in US patent Class 705 issued by USPTO has increased more than 5 times from 970 in 1999 to 5220 in 2010⁶⁴⁰. Of course, the reason for the increase of the amount may be that business method inventions were kept secret before the changes to the patent law came about. When the owners of these inventions realised that such inventions could be patented, many applications for patents emerged in large numbers. However, it is possible that the availability of business method patents will encourage more investment in R & D by start-up firms or more efficient trading of technologies.⁶⁴¹ Thus, we cannot repudiate the position that granting business method patents may stimulate investment in R & D for business method – related inventions. We can only say that the current evidence is not able to justify the granting of business method patents based on the monopoly – profit – incentive thesis.

⁶³⁸ Dreyfuss, R., 2006. Stated Street or Easy Street: Is Patenting Business Methods Good For Business?" *US Intellectual Property Law and Policy*, **1**, pp. 1-27. In this study, the author stated two effects following with the first mover advantages: network effects (where the value of a product rises as the number of adopters increases) and lock-in effects (where the costs of switching products or providers is nontrivial).

⁶³⁹ Hunt, R. M., 2010. Business Method Patent and U.S. Financial Services. *Contemporary Economic Policy*, **28**, pp. 322-352.

⁶⁴⁰ The data come from the USPTO's patent database and were searched by the author.

⁶⁴¹ Hunt, R. M., 2008. Ten Years After: What Are the Effects of Business Method Patents in Financial Services? *Business Review*, **Q3**, pp. 21-34.

The lower initial R & D costs also imply that the exchange between the monopoly right and the publication of the business method – related inventions seems to be not worthwhile when the social costs of the monopoly (e.g. artificially high prices, misallocation of resources, transaction costs etc.) are considered. This is especially so, when business method – related inventions are difficult to keep as secrets and are easily imitated. However, we cannot deny that the publication of inventions to some extent provides benefits. Business method patents may be lucrative opportunities to license a patented business method when the business method is disclosed and protected by the patent instead of being kept secret. Also, a business method patent can be added to the intellectual property portfolio of a company and attract investment, at least for technical business method patents, when the business method is disclosed and protected by a patent instead of being kept secret. Furthermore, the disclosure of a business method patent is good not only for the inventors per se but also for public interests. In Section 5.2, the statistical analysis of the comparison of times to be referenced by subsequent patents between business method patents and general patents has showed that business method – related inventions are valuable for subsequent inventors. However, the harm produced by general patents obviously still cannot be avoided within the class of business method patents. At least for now, business method patents are litigated more often than general patents. Some of these litigations have resulted in very large settlements. A natural question is that compared to the impact of general patents, is it worth risking such higher harms for lower benefits gained through patenting business method - related inventions. Due to the difficulty in accurately measuring the benefits of business method patents, the current evidence is not able to determine whether the benefits of business method patents outweigh the costs.

None of the existing empirical study literature can determine that it is essential to provide patent protection for the business method – related inventions based on the classical justifications of patents. However, the existing empirical study literature also cannot determine that the serious harms will occur if patenting business method – related patents except higher litigation risks for business method patents than for general patents. Yet, such risks are most likely to result from the unclear expression of specifications in applications for business method patents based on the ambiguous attitude of EPO in patenting business method – related inventions. The existing reward function, incentive function, disclosure function and other economic benefits of business method patents mean that we cannot clearly assert that patenting business method – related inventions should be rejected. But, when the US position is considered, which leads to US Infringement risks being incurred by the European companies, explicitly allowing business method patents, even increasing the scope of patenting business method – related inventions, in Europe seems to be a valuable and advisable approach to solving these problems unless the US changes its own position.

Chapter Seven: Conclusion

The ambition of this work is to provide an assessment of the patentability of business methods in the European and US jurisdictions and an evaluation of the implications and give some suggestions as to the way ahead in Europe for business method patenting.

To attain this goal more fully, triangulation of research is important. A traditional legal research method, a black letter law approach, was first adopted in order to understand and analyse the present legal frameworks provided by the EPC and the US patent law in relation to the patenting of business method – related inventions and to draw the distinctions between the two regimes. The author thereafter conducted a socio-legal research in order to assess whether patenting business method – related inventions are necessary or appropriate.

7.1 Conclusion of black letter law finding concerning the European and US jurisdictions: What kind of business method – related inventions can be patented in Europe at present and what differences are these between the US and Europe in the present law for business method patents?

In Europe, Article 52 EPC, which rules patentable inventions, provides "(1) European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application. (2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1: (a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; (d) presentations of information. (3) Paragraph 2 shall exclude the patentability of the subject- matter or activities referred to therein only to the extent to which

a European patent application or European patent relates to such subject – matter or activities as such." With construing the language of the provision and considering the intention of the legislation, the excluded patent - eligible business method - related inventions are only excluded as business methods "as such". "As such" is a difficult phrase. It is easier to say what it is not than what it is. Provided an invention is achieved by a "field of technology" (even where the technology is characterised as a business method) then it is not excluded subject-matter or activities "as such". This is the case where the operative process has a "technical characteristic", or makes a "technical contribution" (i.e. solves a technical problem or has a technical effect involved in achieving an end), which is not otherwise excluded. Thus, when a business method - related invention is not regarded as being so "as such", then the invention will be patent - eligible subject matter.

According to the analysis of the relevant case law of the EPO Boards of Appeal, the criteria to determine whether an invention has a "technical character" are (1) whether a tangible apparatus is involved; or (2) if no tangible apparatus is involved in the invention, whether the invention involves a technical means or achieves a technical effect.

In the US, "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof may obtain a patent therefor", which has been provided by the US Patent Act (35 U.S.C §101). Only "abstract ideas, laws of nature and natural phenomena" are excluded from patent - eligible subject matter, which exclusion has been judicially created by the US Supreme Court. Business methods, the heart of the issues surrounding the thesis, are to be defined as any human activity which act on business fields and therefore cannot be "laws of nature" or "natural phenomena". Thus, if a business method

- related invention is beyond a purely "abstract idea", it will in principle be a patent - eligible subject matter in the US.

At the very start of the thesis, after introducing the previous terms and concepts about “business method” in the law and relevant academic discussion, the author defined “business method” studied in this thesis as “a method, based on commercial interests, to conduct administration or customer service implemented with or without one or more tangible apparatuses, intangible apparatuses, or combination of tangible and intangible apparatuses”⁶⁴². To the effect that, considering the practice in the decisions of the Boards of Appeal of the European Patent Office or the Decision of the United States Court of Appeals for the Federal Circuit, the business method – related inventions can be analysed into four groups: (1) a business method tangible apparatus invention: an apparatus which is used for one or more methods to conduct administration or customer service with commercial interests; (2) a business method intangible apparatus invention: an intangible apparatus which is implemented with or without any apparatus and is used for one or more methods to conduct administration or customer service within commercial interests; (3) a business method process implemented using tangible apparatus invention: a process which is used to conduct administration or customer service through using one or more apparatus(es) for commercial interests; (4) a purely business method process invention: being a process which merely is a method implemented without any tangible and intangible apparatus for administration or customer service within a business field.

7.1.1 The differing attitudes of the US and European institutions to patent business method tangible apparatus invention

⁶⁴² See Section 3.1.2, Chapter 3 of this thesis.

Such an invention is essentially a tangible apparatus invention. A tangible apparatus invention, regardless of its function - acting on business fields or not, absolutely is a patent - eligible subject matter either in the US or in Europe. In Europe, the tangible apparatus itself addresses the “technical character” of the invention. Therefore, the invention is a patent – eligible subject matter under the meaning of Article 52 (1) EPC. A physical entity is a machine or manufacture which is beyond the scope of “abstract ideas” and therefore patent eligible in the US. Thus the scope of patenting business method tangible apparatus inventions in the US and Europe is the same.

However, although such an invention has patent eligibility in the US and Europe, whether it can be issued patent protection finally is different as between the US and Europe because the treatment in the determining the patentability of the patent – eligible subject matter is different. The major difference is in determining the inventive step / nonobviousness requirement. The US institutions only consider whether there are differences between the prior art and the claimed invention and whether the differences are nonobvious to the skilled person in the art concerned. In Europe, the examiners not only need to consider the differences between the prior art and the claimed invention and whether the differences are nonobvious to the skilled person, but also need to examine whether the differences are technical, or whether the utilised business method makes a technical contribution to the invention. Thus a business method tangible apparatus invention will be non-patentable in Europe, only where if it doesn't involve any technical contribution, while the same invention could be patentable in the US.

Furthermore, the US and European institutions have differently defined “a skilled person”. In the US patent system, “skilled person” is defined as a person “skilled in the art” to which the invention pertains or with which it is “most nearly connected”. This has the implication that if the development of the invention is addressed in the related business fields, the “skilled person” is a person who has ordinary skill in the business fields, i.e. an ordinary skilled businessman. If the development of the invention is addressed in the technological fields, the “skilled person” is a person who has ordinary skill in the relevant technological fields. If the development of the invention is addressed in both the technological fields and business fields, the “skilled person” is an ordinary skilled businessman with the knowledge of relevant technology. This is different in Europe as the EPO specifies a “skilled person” in determining business method patents as a skilled businessman with the knowledge in the relevant technological fields. An ordinary skilled businessman with the knowledge in the relevant technology obviously has a much more detailed knowledge than a mere businessman or a mere technical expert. Therefore, a business method tangible apparatus whose development is addressed merely in business fields or merely in technology fields could be regarded as lacking an inventive step by a “skilled person” in Europe, but is nonobvious for a “skilled person” in the US. The result is that the scope of patentable business method tangible apparatus inventions in the US is much broader than in Europe.

7.1.2 A business method process implemented with tangible apparatus invention

The EPO Boards of Appeal have affirmed that even if an invention does not involve any tangible apparatus, the invention can still be regarded as being in the fields of technology if it involves a technical means or achieves a technical effect. “Being implemented with a tangible apparatus” means a technical means is used in the invention, and therefore such an invention,

which is business method process implemented with a tangible apparatus, is a patent – eligible subject matter under the meaning of Article 52 (1) EPC.

However, such an invention could be regarded as nonpatent–eligible in the US. In the US such an invention is attributed to a “process” invention in determining whether it has patent – eligibility. If a “process” invention is beyond “abstract ideas, laws of nature and natural phenomena”, it will be patent eligible. The problem is the US institutions do not give absolute criteria to determining what distinguishes a patent–eligible “process” from a nonpatent–eligible “process”. At present, the US Supreme Court and the US Court of Appeals for the Federal Circuit (CFAC) have established the following tests: (1) the "machine - or - transformation" test, which provides that: “a process will qualify to be considered for patenting if it is tied to a particular machine or tangible apparatus, or else transforms an article from one thing or state to another”. This is used to determine whether the claimed "process" invention is patent eligible. If the claimed "process" can pass the test, it will be patent eligible; (2) the "useful, concrete and tangible result" test is not enough to determine whether the claimed "process" invention is patent eligible. But if a claimed "process" invention cannot pass the test, it is definitely an abstract idea and should be excluded from a patent - eligible subject matter. Thus in the US, for a business method process implemented with tangible apparatus invention, if the tangible apparatus used in the invention is particular or the invention as a whole transforms an article from one thing or state to another, such an invention is still patent eligible. Otherwise such an invention will be a non-patent - eligible subject matter in the US unless it can be proved that it is beyond being merely an abstract idea. Therefore, the scope of a patent eligible business method process implemented with a tangible apparatus invention in Europe is broader than in the US.

However, the broader scope of patent eligibility in business method process implemented with tangible apparatus inventions in Europe does not mean that the scope of patentability in business method process implemented with tangible apparatus inventions in Europe is also broader than in the US. In Europe, whether the tangible apparatus is "particular" or the invention as a whole transforms an article from one thing or state to another is also needed to be considered because this is also important in determining whether the invention has a technical contribution. To be tied with a "particular" machine or tangible apparatus means that the machine or tangible apparatus is essential. If the "skilled person" cannot foresee the use of the tangible apparatus and solve the technical problem to conduct such a new business method, it will be regarded as "solving a technical problem" and therefore fulfil the inventive step requirement in Europe. "Transforming an article from one thing or state to another" means such an invention has a technical effect and is therefore patentable. Furthermore, under the current rules, it is difficult to believe that a process invention, which either is not tied with a particular tangible apparatus, or which does not transform an article from one thing or state to another, solves a technical problem or achieves a technical effect. Thus, the scope of patentability of business method process implemented with tangible apparatus inventions in the US is just slightly broader than in Europe due to the more strict criteria of a "skilled person" which is held in Europe but not in the US.

7.1.3 Pure business method process invention

The language of the decisions in the Boards of Appeal indicates that this type of method could be patent - eligible subject matter provided it produces a technical effect. However, given this interpretation of the definition of a pure business method, such an invention can only exist in relation to administration or customer service. Administration and customer

service are abstract matters and do not belong to any technical art. This means that the change (or to say “transformation”) resulting from the use of such an invention will only occur in nontechnical fields. Thus, no technical effect will be achieved by such an invention. That is to say that according to the stage of current technology, it is not possible to give any example to show that a pure business method process invention could produce a technical effect. Moreover, such an invention would not be implemented by any “technical means”, with the effect that the use of pure method would not meet any technical problem and therefore the invention would not solve any technical problem in the practice of the business method. So we conclude that if no technical means is involved, no technical effect achieved and no technical problem is solved then this shows that there is no technical character involved in such an invention. Therefore, a pure business method process invention would not be patent – eligible subject matter under the meaning of Article 52 (1) EPC, at least so far as for today’s state - of - art technology is concerned. In other words, pure business method process inventions belong to business method “as such” which is one of the patent excluded subject matters under the meaning of Article 52 (2) and (3) of the EPC.

Similarly, due to such an invention not transforming an article from one thing or state to another, then based on the existing test, the “machine – or – transformation test”, which is used to determine whether a “process” is patent eligibility accepted by the US Supreme Court, it can be seen that it is a nonpatent-eligible subject matter in the US unless “there [is] evidence to prove that it is beyond ‘abstract ideas’ ” which is provided by the US Supreme Court for possible future technology.

The uncertainty concerning future technology results in our not being able to point out what differences there will in the future be in patenting pure business method process inventions.

But so far as today's state – of – art technology is concerned, we can say that the present prohibitions against patentability in the US and European institutions to pure business method process inventions is the same in effect, that is: all of them regards pure business method process inventions as excluded from patentable subject matter.

7.1.4 Business method intangible apparatus invention

Such inventions involve specific intangible apparatus (e.g. software) inventions. They can be implemented with or without a tangible apparatus. If a tangible apparatus is needed in implementing such an invention, the criteria to determine whether the invention is patentable is the same as the criteria for determining the patentability of business method process implemented with tangible apparatus inventions. This also means equating the scope of patentable business method process implemented with tangible apparatus inventions, the scope of patentable business method intangible apparatus inventions which are implemented with tangible apparatus in the US is slightly broader there than in Europe.

When such an invention is implemented without any tangible apparatus, if it produces a technical effect or solves a technical problem, such an invention will be a patent – eligible invention under the meaning of Article 52 (2) EPC. And if it does not produce a technical effect and does not solve any technical problem, then such an invention will be “as such” and will be excluded from patent – eligible subject matter in Europe. However, the problem is that as far as we know, the only type of intangible apparatus which can currently be used to conduct business methods is software. Under current technology, software must be implemented with hardware, i.e. a tangible apparatus (such as a CPU, RAM, etc.). It is not

known what other type of intangible apparatus(es) could be used to conduct business methods without any tangible apparatus in the future.

Overall, at present, a business method – related invention can be patented in Europe if it is a tangible apparatus for conducting business method, an intangible apparatus implemented with tangible apparatus for conducting business method, or a business method implemented with tangible apparatus, and also provided it can then meet the other requirements of patentability. However, based on “technical character” and “technical contribution” being required by the EPC and the differences in the scope of the “skilled person” as between the US and Europe, so far as today is concerned, the scope of patentable business method – related inventions in the US is still broader than in Europe. Some business method – related inventions can be protected by the US patent system but cannot be protected by the European patent system.

However, being legally possible does not mean being rational. The thesis has also examined how far business method – related invention should be protected in Europe.

7.2 Whether the scope of business method – related invention protections should be extended in Europe

Reviewing the history of the origins and development of the patent systems, the author found that patents, in essence, are an economic mechanism to encourage innovation and promote new technologies, and thereby to develop the economy in the country (or region regulated in). Thus, this study has examined whether Europe should grant patent protection to business method – related inventions focusing on the social and economic effects, especially given that

the US position in patenting business method – related inventions is slightly different from the European position and therefore does or should show differences effects.

To carry out this examination, this research studied correlations between patent protection and the economy: what are the economic justifications for patent protection, and what positive and negative effects are brought to bear by patents. If the effects produced by business method patents can fulfill the justifications of patent protection, and patenting business method – related inventions will result in more (or equal) positive effects (benefits) with fewer (or equal) negative effects (costs), it is reasonable to propose business method patents should be adopted in Europe. Unfortunately, the economic analysis in this research cannot give clear evidence to support extending the scope of patent protections to business method – related inventions. Although patenting business method – related inventions is helpful to recover the returns of R & D costs in developing the business method – related inventions, to reduce subsequent innovators' innovation costs and to bring some social welfare (e.g. enhancing labour division), yet this evidence cannot prove categorically that it is necessary to extend patents in order to optimise these benefits. The low initial R & D costs and revenue for the business which has created such inventions seems to show that patenting business method – related inventions is not always essential.

However, although the initial R & D costs of developing business method – related inventions may be lower than the initial R & D costs in relation to general patentable inventions, it cannot be said that that the revenue for the business created by the business method – related inventions will be enough to cover the costs and therefore that business method patents will not be needed. The complexity in measuring the revenue directly or indirectly created by business method – related inventions has resulted in this research not

providing a firm answer to whether patents is needed in order to protect the recovery of the R & D costs of developing business method – related inventions. The findings of our economic analysis merely show that patenting business method – related inventions can enable the recovery of R & D costs but not the extent of that recovery. Thus, on the grounds of the “reward – by – monopoly” thesis, none of existing evidence can categorically establish that business method patents should be rejected.

Also, we have shown that patenting business method – related inventions is useful for subsequent inventions. At least the disclosure of the business method – related inventions is helpful to minimise the initial R & D costs of subsequent inventions. Furthermore the US experience shows in general that business method patents are regularly cited as prior art references in subsequent patents more times than they are for general patents. When we considered the development of later business method patents it became clear that the effectiveness of the requirements to disclose the technical basis of business method - related inventions in specification has a definite effect in stimulating and inspiring the subsequent inventions, so it is undeniable that the disclosure of business method - related inventions is helpful in generating the spark of creativity for subsequent inventions. Hence, the benefit of patenting business method - related inventions, promoting new inventions, is a genuine benefit. This research has not been able to measure quantitatively whether the costs of patenting outweigh the benefits obtained through the granting of monopoly rights by patent. But we also cannot state that patent protection should not be issued to business method - related inventions based on the "monopoly - profit - incentive" thesis and the "exchange - for - secrets" thesis.

Thereafter, considering the results which came from the analysis of the US patented business methods' quality, the quality of business method patents is at much the same level as with the general patents. This thesis compared the number of prior art references, which are showed was an important patent quality indicator. This was achieved by documenting the number of forward and backward citations between business method patents and general patent in the US between 1999 and 2009. We showed also that there was no significant difference as between business method patents and general patents. The results this study shows that business method patents are in fact cited significantly more as prior art than as for general patents for the period. It is difficult for anyone to assert that an invention which is cited so many times in the prior art is low quality. This means that the worry, that allowing business method patents will generate more lower quality patents and produce more harm than good is not a realistic worry.

So it remains that the economic justifications for patents gives a relatively equivocal view as between extending patent protection to business method – related inventions or disallowing business method patents in Europe. However, considering European firms' infringement risks in the US, allowing business method patents may be a better approach for Europe, this would remain true unless or until the US changes its own position as regards business method patents or if the relevant infringement law of the US is changed. Also our economic analysis showed that when the US position is considered, infringement risks would favour it. On balance it appears that there may be some good reason to think that Europe should extend the scope of patents and adopt stronger protection for business method patents.

7.3 Limitations of this study and recommended further research

To determine whether a new type of invention should be protected by patent mechanisms, the appropriate approach should be to assess whether the benefits of the new type of patents outweighs the costs through a quantitative economic analysis. Although the author has realized the argument should not be based on anecdotal evidence but on quantitative empirical evidence, nevertheless the author's lack of advanced mathematical ability and the practical difficulties in measuring the actual social costs and benefits given by business method patents was not possible to achieve within the present study. This research was unable to conduct a quantitative analysis to compare whether the overall benefits of business method patents could outweigh their social costs. There are immense difficulties in doing so validly, reliably and objectively. But much could still be achieved by means of qualitative indicators. Future quantitative confirmation of this research would be beneficial. What is needed is a more objective evaluation that considers and quantifies the substantial cost (and benefits) associated with business method patents in its various forms and categories. A Cost – Benefit approach generally implies the estimation of the gains and the losses derived from a single rule in order to test the rule and to establish the most optimum balance of net benefits. Benefits consist of the private gains derived from the patent reward and protection and of the social ones made up of high incentives and results in terms of innovation, dissemination and acceleration of inventive process. On the other hand, costs are also quite significant since they refer to transaction and administrative costs incurred by inventors in R & D, in drafting claims, obtaining patents and receiving an adequate level of protection against infringement. Moreover costs include the social deadweight loss and the other losses due to the anticommons and rivalry problems, coupled with the eventual reduction of technological advances. Legal uncertainty and unpredictability may also represent a cost for both inventors and society. There are clearly a lot of types of cost and benefit to analyse and evaluate. The complexity of type business method inventions which must be addressed by the future

researchers and they must find appropriate methods to distinguish what precise match of costs and benefits resulted from different types of business method – related inventions and which benefits and costs are derived from other business and environmental factors. This work has been beyond the scope of the present research.

In our economic analysis of the business method patents, this research regarded business method apparatus patents and business method process patents as a whole. In fact, business method apparatus patents and business method process patents may result in different impacts with different social costs. If possible, each type needs its own analysis if we are to argue one or other type of them should be protected under the patent system.

Furthermore, in this research, the major evidence supporting patenting business method – related inventions is based on infringement risks resulting from the differences between the current US and European positions in patenting business method – related inventions and the relevant US infringement laws. However, under the US legal principles, the judicial system’s decisions and judicial interpretation of statutory law provisions are becoming an ever larger part of the law. Other judges need to look to these decisions as a guideline or as a necessary precedent to follow, while making their own decisions concerning interpreting the correct law. Also, there is a difference between Britain and other countries which share a common law system in that the American common law system is characterized as legal realism. Legal realism emerged as a school of jurisprudence in the 1930s and remains popular in US jurisprudence. In the US the judges make the law in ways that tend to reflect their attitudes and the relative power relations of larger social interests that lurk behind litigation as well as the interpersonal relations of judges on and off multimember courts.⁶⁴³ Thus, the difference

⁶⁴³ Patterson, E. W., 1953. *Jurisprudence: Men and Ideas of Law*. Brooklyn, US: Foundation Press.

between the US and European position in patenting business method – related inventions may melt away following changes in US judges’ attitudes. Thus a major factor, infringement risk, which provides support for amending business method patent provisions in Europe, will be changed also. Further research needs to pay attention to this situation.

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Appendix 1: Selected US Patent Act (35 U.S.C.) Sections

Section 100. Definitions

When used in this title unless the context otherwise indicates—

- (a) The term “invention” means invention or discovery.
- (b) The term “process” means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.
- (c) The terms “United States” and “this country” mean the United States of America, its territories and possessions.
- (d) The word “patentee” includes not only the patentee to whom the patent was issued but also the successors in title to the patentee.
- (e) The term “third-party requester” means a person requesting ex parte reexamination under section 302 or inter partes reexamination under section 311 who is not the patent owner.

Section 101. Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Section 102. Conditions For Patentability; Novelty and Loss of Right to Patent.

A person shall be entitled to a patent unless—

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
- (c) he has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor’s certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor’s certificate filed more than twelve months before the filing of the application in the United States, or
- (e) the invention was described in
 - (1) an application for patent, published under section 122 (b), by another filed in the United States before the invention by the applicant for patent or
 - (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; [1] or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g)
 - (1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person’s invention thereof the invention was made by such other inventor and not abandoned,

suppressed, or concealed, or

(2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Section 103. Conditions for Patentability; Non-Obvious Subject Matter

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

(b)

(1) Notwithstanding subsection (a), and upon timely election by the applicant for patent to proceed under this subsection, a biotechnological process using or resulting in a composition of matter that is novel under section 102 and nonobvious under subsection (a) of this section shall be considered nonobvious if—

(A) claims to the process and the composition of matter are contained in either the same application for patent or in separate applications having the same effective filing date; and

(B) the composition of matter, and the process at the time it was invented, were owned by the same person or subject to an obligation of assignment to the same person.

(2) A patent issued on a process under paragraph (1)—

(A) shall also contain the claims to the composition of matter used in or made by that process, or

(B) shall, if such composition of matter is claimed in another patent, be set to expire on the same date as such other patent, notwithstanding section 154.

(3) For purposes of paragraph (1), the term "biotechnological process" means—

(A) a process of genetically altering or otherwise inducing a single- or multi-celled organism to—

(i) express an exogenous nucleotide sequence,

(ii) inhibit, eliminate, augment, or alter expression of an endogenous nucleotide sequence, or

(iii) express a specific physiological characteristic not naturally associated with said organism;

(B) cell fusion procedures yielding a cell line that expresses a specific protein, such as a monoclonal antibody; and

(C) a method of using a product produced by a process defined by subparagraph (A) or (B), or a combination of subparagraphs (A) and (B).

(c)

(1) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

(2) For purposes of this subsection, subject matter developed by another person and a claimed invention shall be deemed to have been owned by the same person or subject to an obligation of assignment to the same person if—

(A) the claimed invention was made by or on behalf of parties to a joint research agreement that was in effect on or before the date the claimed invention was made;

- (B) the claimed invention was made as a result of activities undertaken within the scope of the joint research agreement; and
 - (C) the application for patent for the claimed invention discloses or is amended to disclose the names of the parties to the joint research agreement.
- (3) For purposes of paragraph (2), the term “joint research agreement” means a written contract, grant, or cooperative agreement entered into by two or more persons or entities for the performance of experimental, developmental, or research work in the field of the claimed invention.

Appendix 2: Selected European Patent Convention Articles

Article 52. Patentable Inventions

(1973 Version)

(1) European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step.

(2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:

- (a) discoveries, scientific theories and mathematical methods;
- (b) aesthetic creations;
- (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;
- (d) presentations of information.

(3) The provisions of paragraph 2 shall exclude patentability of the subject-matter or activities referred to in that provision only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

(4) Methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body shall not be regarded as inventions which are susceptible of industrial application within the meaning of paragraph 1. This provision shall not apply to products, in particular substances or compositions, for use in any of these methods.

(2000 Version)

(1) European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.

(2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:

- (a) discoveries, scientific theories and mathematical methods;
- (b) aesthetic creations;
- (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;
- (d) presentations of information.

(3) Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

Article 54. Novelty

(1973 Version)

(1) An invention shall be considered to be new if it does not form part of the state of the art.

(2) The state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application.

(3) Additionally, the content of European patent applications as filed, of which the dates of filing are prior to the date referred to in paragraph 2 and which were published under Article 93 on or after that date, shall be considered as comprised in the state of the art.

(4) Paragraph 3 shall be applied only in so far as a Contracting State designated in respect of the later application, was also designated in respect of the earlier application as published.

(5) The provisions of paragraphs 1 to 4 shall not exclude the patentability of any substance or composition, comprised in the state of the art, for use in a method referred to in Article 52, paragraph 4, provided that its use for any method referred to in that paragraph is not comprised in the state of the art.

(2000 Version)

(1) An invention shall be considered to be new if it does not form part of the state of the art.

(2) The state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application.

(3) Additionally, the content of European patent applications as filed, the dates of filing of which are prior to the date referred to in paragraph 2 and which were published on or after that date, shall be considered as comprised in the state of the art.

(4) Paragraphs 2 and 3 shall not exclude the patentability of any substance or composition, comprised in the state of the art, for use in a method referred to in Article 53(c), provided that its use for any such method is not comprised in the state of the art.

(5) Paragraphs 2 and 3 shall also not exclude the patentability of any substance or composition referred to in paragraph 4 for any specific use in a method referred to in Article 53(c), provided that such use is not comprised in the state of the art

Article 56. Inventive Step

(1973 Version)

An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art. If the state of the art also includes documents within the meaning of Article 54, paragraph 3, these documents are not to be considered in deciding whether there has been an inventive step.

(2000 Version)

An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art. If the state of the art also includes documents within the meaning of Article 54, paragraph 3, these documents shall not be considered in deciding whether there has been an inventive step.

Article 57. Industrial Application

(1973 Version)

An invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture.

(2000 Version)

An invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture.

Appendix 3: Data for Statistical Patent Quality Analysis

3.1A General patents quality indicators (Year 1999)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,009,554	10	0	10	1	
6,009,102	7	1	8	11	
6,008,600	9	0	9	1	
6,008,096	11	0	11	6	
6,007,590	105	5	110	9	
6,007,089	19	0	19	3	
6,006,587	15	0	15	0	
6,006,086	7	0	7	4	
6,005,584	5	0	5	33	
6,005,083	104	53	157	13	
6,004,581	8	3	11	1	
6,004,079	10	1	11	6	
6,003,577	3	0	3	1	
6,003,075	4	0	4	58	
6,002,574	11	0	11	11	
6,002,070	15	14	29	2	
6,001,568	6	37	43	2	
6,001,063	8	0	8	2	
6,000,558	3	0	3	27	
6,000,056	39	0	39	20	
5,999,555	79	2	81	9	
5,999,054	4	1	5	5	
5,998,552	37	14	51	19	
5,998,048	1	10	11	18	
5,997,545	7	0	7	6	
5,997,044	5	0	5	19	
5,996,542	17	1	18	3	
5,996,040	8	1	9	1	
5,995,536	20	6	26	4	
5,995,034	4	0	4	1	
5,994,532	3	0	3	0	
5,994,030	2	2	4	11	
5,993,529	5	0	5	0	
5,993,028	3	0	3	5	
5,992,526	10	1	11	14	
5,992,025	6	0	6	12	
5,991,523	10	1	11	29	
5,991,021	3	0	3	4	
5,990,519	3	0	3	3	
5,990,013	10	2	12	32	

3.1A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,989,511		14		23	37	13
5,989,008		16		3	19	3
5,988,506		18		0	18	73
5,988,004		14		0	14	1
5,987,501		3		0	3	37
5,986,998		20		0	20	14
5,986,495		3		0	3	1
5,985,992		37		2	39	13
5,985,488		15		1	16	13
5,984,985		4		0	4	3
5,984,532		16		0	16	7
5,984,031		38		4	42	37
5,983,528		8		0	8	6
5,983,026		24		0	24	1
5,982,524		7		0	7	1
5,982,020		3		1	4	1
5,981,518		14		8	22	1
5,981,016		11		1	12	1
5,980,514		18		0	18	58
5,980,011		21		0	21	32
5,979,510		8		0	8	3
5,979,007		16		0	16	3
5,978,505		4		11	15	1
5,978,003		18		0	18	7
5,977,502		5		0	5	2
5,976,999		28		1	29	3
5,976,497		11		6	17	5
5,975,990		9		1	10	2
5,975,489		22		1	23	18
5,974,987		14		0	14	0
5,974,886		9		0	9	11
5,974,785		38		0	38	6
5,974,684		9		1	10	4
5,974,583		1		0	1	10
5,974,481		2		3	5	8
5,973,475		6		0	6	43
5,972,462		11		0	11	2
5,971,454		14		0	14	1
5,970,449		10		3	13	19
5,969,445		11		0	11	12

3.1A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,968,437		5		0	5	3
5,967,433		24		0	24	3
5,966,431		12		2	14	36
5,965,429		5		6	11	0
5,964,422		9		0	9	8
5,963,421		9		0	9	0
5,962,417		11		50	61	3
5,961,407		14		1	15	4
5,960,403		6		0	6	94
5,959,397		4		0	4	6
5,958,394		6		1	7	1
5,957,392		9		0	9	1
5,956,388		6		0	6	1
5,955,379		25		3	28	5
5,954,371		5		0	5	8
5,953,368		43		16	59	10
5,952,364		14		5	19	2
5,951,359		7		0	7	5
5,950,356		5		4	9	43
5,949,350		6		0	6	19
5,948,395		7		0	7	0
5,947,392		44		0	44	7
5,946,391		11		0	11	3
5,945,386		5		0	5	1
5,944,383		24		0	24	17
5,943,380		9		0	9	16
5,942,378		5		0	5	3
5,941,376		12		0	12	1
5,940,373		7		0	7	10
5,939,371		16		0	16	0
5,938,367		67		6	73	16
5,937,362		3		4	7	8
5,936,359		18		0	18	4
5,935,350		18		1	19	2
5,934,335		8		1	9	21
5,933,329		3		0	3	1
5,932,323		7		0	7	6
5,931,317		19		0	19	0
5,930,314		17		20	37	9
5,929,311		2		17	19	2

3.1A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
5,928,309	69		4	73	55
5,927,307	10		0	10	1
5,926,307	5		0	5	3
5,925,304	11		0	11	2
5,924,300	22		2	24	9
5,923,296	4		2	6	15
5,922,292	8		0	8	4
5,921,291	16		0	16	2
5,920,288	3		0	3	2
5,919,283	2		0	2	1
5,918,280	3		0	3	17
5,917,274	4		0	4	2
5,916,269	18		1	19	13
5,915,265	12		2	14	9
5,914,261	0		5	5	1
5,913,258	4		0	4	8
5,912,256	5		2	7	2
5,911,252	14		0	14	30
5,910,246	9		4	13	9
5,909,240	10		1	11	6
5,908,278	28		0	28	5
5,907,275	19		0	19	9
5,906,271	8		3	11	19
5,905,266	3		0	3	10
5,904,263	10		0	10	4
5,903,256	8		0	8	1
5,902,245	74		28	102	12
5,901,236	15		7	22	5
5,900,232	8		0	8	2
5,899,228	10		0	10	5
5,898,223	7		0	7	55
5,897,219	9		0	9	3
5,896,214	9		0	9	0
5,895,210	9		0	9	3
5,894,207	2		0	2	9
5,893,203	21		0	21	9
5,892,177	6		0	6	3
5,891,150	26		7	33	33
5,890,142	11		2	13	11
5,889,123	4		1	5	2

3.1A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,888,096		23		1	24	10
5,887,068		18		0	18	8
5,886,053		3		13	16	12
5,885,016		8		0	8	3
5,884,003		33		0	33	12
5,882,985		10		1	11	1
5,881,967		23		0	23	1
5,880,952		13		4	17	21
5,879,938		16		46	62	5
5,878,918		6		0	6	1
5,877,902		16		1	17	7
5,876,883		5		0	5	4
5,875,868		13		0	13	13
5,874,859		6		0	6	4
5,873,846		8		0	8	1
5,872,838		6		0	6	1
5,871,820		23		2	25	24
5,870,797		9		0	9	1
5,869,774		18		0	18	1
5,868,749		60		24	84	50
5,867,726		11		6	17	77
5,866,704		5		0	5	10
5,865,682		7		0	7	4
5,864,667		18		3	21	49
5,863,650		1		0	1	4
5,862,631		12		0	12	5
5,861,618		12		1	13	27
5,860,598		8		0	8	5
5,859,586		8		0	8	4
5,858,563		5		2	7	25
5,857,597		11		0	11	11
5,856,583		2		0	2	0
5,855,562		13		0	13	12
5,855,059		12		4	16	28

3.1B Business Method Patents Quality indicators (Year 1999)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
5,857,020	17		0		57
5,857,023	7		13		9
5,857,174	3		0		40
5,857,175	14		0		152
5,857,176	9		1		47
5,864,620	34		0		46
5,864,685	5		0		18
5,864,818	16		12		20
5,864,821	4		0		2
5,864,822	48		19		38
5,864,824	7		3		3
5,864,825	8		2		8
5,864,828	11		13		104
5,864,829	25		0		7
5,864,831	48		1		15
5,867,823	11		0		3
5,870,715	12		1		3
5,870,720	4		0		12
5,870,721	23		14		151
5,870,722	9		0		11
5,870,723	34		0		114
5,870,725	21		9		72
5,870,726	14		1		8
5,872,844	8		0		39
5,873,066	3		4		57
5,873,067	5		0		2
5,873,071	22		18		128
5,873,072	6		5		92
5,875,431	5		0		58
5,875,433	19		0		27
5,875,435	15		2		41
5,875,437	6		0		162
5,878,401	14		4		61
5,878,403	12		0		173
5,878,405	16		43		39
5,883,957	3		7		32
5,884,271	41		4		172
5,884,276	12		0		10
5,884,281	22		0		33
5,884,283	14		1		25

3.1B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,884,285		11		11	22	109
5,884,287		8		8	16	64
5,889,863		63		391	454	125
5,890,131		1		7	8	22
5,890,137		8		2	10	132
5,890,138		6		1	7	241
5,890,140		76		11	87	112
5,893,071		2		0	2	15
5,893,072		5		0	5	20
5,893,074		5		0	5	46
5,893,076		12		8	20	74
5,893,079		18		8	26	83
5,893,903		13		0	13	7
5,893,904		8		0	8	11
5,895,454		10		1	11	145
5,897,619		1		6	7	19
5,897,620		10		23	33	145
5,897,624		2		2	4	6
5,898,586		4		2	6	4
5,898,777		5		0	5	22
5,899,979		9		0	9	28
5,899,980		22		2	24	151
5,899,981		4		0	4	9
5,903,652		11		0	11	61
5,903,873		15		0	15	24
5,903,874		14		0	14	26
5,903,875		12		2	14	10
5,903,876		0		4	4	13
5,903,878		19		0	19	110
5,903,879		20		0	20	14
5,905,973		5		0	5	47
5,905,974		15		0	15	170
5,905,976		14		6	20	14
5,907,828		20		9	29	23
5,907,829		2		0	2	19
5,907,830		7		1	8	71
5,907,832		21		0	21	14
5,908,469		10		0	10	59
5,909,492		68		1	69	123
5,909,668		6		0	6	1

3.1 B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,909,669		5		4	9	35
5,909,671		8		1	9	14
5,909,673		5		2	7	44
5,910,988		54		0	54	138
5,911,131		15		1	16	16
5,911,135		12		15	27	121
5,911,136		3		4	7	122
5,913,197		17		9	26	13
5,913,198		14		0	14	31
5,913,199		3		0	3	4
5,913,202		1		0	1	140
5,913,203		19		4	23	33
5,915,023		22		0	22	54
5,915,241		15		0	15	27
5,915,244		8		9	17	44
5,915,246		9		0	9	19
5,918,207		5		0	5	43
5,918,208		14		4	18	29
5,918,209		1		19	20	48
5,918,211		10		0	10	112
5,918,212		13		0	13	16
5,918,215		4		0	4	10
5,918,216		4		3	7	23
5,918,217		26		13	39	136
5,918,218		9		11	20	69
5,920,845		6		2	8	16
5,920,847		7		46	53	196
5,920,848		6		4	10	125
5,920,849		2		2	4	21
5,920,850		15		0	15	17
5,924,078		14		0	14	29
5,924,082		25		4	29	219
5,924,083		21		4	25	105
5,926,792		22		0	22	19
5,926,793		7		0	7	5
5,926,794		10		5	15	44
5,926,795		18		0	18	23
5,926,796		17		38	55	47
5,926,798		6		0	6	68
5,926,799		7		2	9	4

3.1 B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,926,800		1		9	10	61
5,926,801		7		0	7	25
5,930,156		24		0	24	16
5,930,760		4		0	4	9
5,930,761		2		0	2	13
5,930,762		6		16	22	69
5,930,763		8		3	11	7
5,930,764		3		9	12	143
5,930,767		31		1	32	145
5,930,771		21		2	23	73
5,930,774		2		0	2	37
5,930,775		4		1	5	29
5,930,776		13		0	13	63
5,933,498		105		52	157	268
5,933,809		1		3	4	29
5,933,810		15		5	20	10
5,933,811		11		20	31	374
5,933,814		12		2	14	6
5,933,815		23		9	32	30
5,933,816		12		0	12	216
5,937,386		5		0	5	6
5,937,391		6		0	6	47
5,937,392		4		3	7	97
5,937,395		11		13	24	34
5,937,396		19		0	19	47
5,940,802		13		3	16	12
5,940,806		14		2	16	20
5,940,808		13		1	14	3
5,940,810		3		19	22	44
5,940,811		36		28	64	131
5,940,812		6		3	9	93
5,940,813		25		3	28	21
5,943,423		18		0	18	131
5,943,652		12		26	38	59
5,943,654		11		2	13	16
5,943,655		23		26	49	65
5,946,659		27		3	30	23
5,946,660		15		0	15	24
5,946,662		6		9	15	77
5,946,666		8		11	19	99

3.1B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				(Prior Patent and Nonpatent References)		
5,946,667		10		5	15	107
5,946,669		11		16	27	15
5,946,671		13		1	14	5
5,949,044		30		8	38	85
5,950,172		4		4	8	44
5,950,175		21		4	25	33
5,950,176		21		6	27	105
5,950,177		47		0	47	49
5,950,179		20		5	25	36
5,953,415		10		2	12	4
5,953,704		28		20	48	47
5,953,705		24		3	27	20
5,953,706		23		3	26	27
5,956,689		25		2	27	13
5,956,691		14		4	18	45
5,956,693		17		7	24	144
5,956,695		41		18	59	56
5,956,696		17		3	20	1
5,956,700		14		14	28	88
5,960,410		5		2	7	7
5,960,414		1		3	4	30
5,960,417		3		0	3	23
5,963,910		23		4	27	38
5,963,918		10		0	10	6
5,963,921		3		0	3	10
5,963,922		5		6	11	16
5,963,924		63		389	452	109
5,963,925		12		21	33	116
5,966,695		2		11	13	132
5,966,700		4		0	4	25
5,970,463		32		24	56	17
5,970,464		8		3	11	51
5,970,466		6		2	8	48
5,970,469		46		15	61	164
5,970,470		12		3	15	49
5,970,471		133		76	209	181
5,970,472		5		10	15	176
5,970,473		25		0	25	59
5,970,478		6		29	35	39
5,970,479		30		44	74	97

3.1B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
5,970,481		134		14	148	13
5,974,145		14		1	15	1
5,974,146		5		0	5	83
5,974,148		82		9	91	25
5,974,390		6		2	8	12
5,974,395		11		6	17	80
5,974,396		8		38	46	155
5,978,766		10		0	10	53
5,978,768		21		21	42	60
5,978,770		3		0	3	32
5,978,775		2		3	5	22
5,978,776		11		0	11	9
5,978,778		1		0	1	49
5,978,780		24		73	97	100
5,983,193		11		0	11	25
5,983,196		12		1	13	59
5,983,200		25		5	30	165
5,983,205		1		4	5	14
5,983,206		14		6	20	25
5,983,208		63		388	451	75
5,983,209		46		0	46	8
5,987,132		67		388	455	57
5,987,429		2		0	2	27
5,987,433		5		2	7	14
5,987,434		14		14	28	109
5,987,440		6		5	11	109
5,991,728		18		0	18	42
5,991,731		8		8	16	38
5,991,735		10		22	32	235
5,991,736		18		4	22	45
5,991,740		7		4	11	66
5,991,741		19		2	21	23
5,991,744		18		2	20	28
5,991,745		5		3	8	12
5,995,945		10		8	18	83
5,999,624		36		0	36	40
5,999,625		0		4	4	19
5,999,907		2		2	4	60
5,999,911		7		8	15	119
5,999,914		7		5	12	105

3.2A General Patents Quality Indicators (Year 2000)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,167,568		8		7	15	18
6,166,617		11		0	11	6
6,165,612		14		0	14	23
6,164,611		35		0	35	18
6,163,608		8		0	8	26
6,162,605		4		3	7	1
6,161,600		6		0	6	2
6,160,597		19		7	26	49
6,159,593		20		3	23	13
6,158,587		8		0	8	4
6,157,585		9		0	9	12
6,156,580		14		0	14	9
6,155,572		42		1	43	3
6,154,569		10		1	11	4
6,153,565		15		0	15	9
6,152,558		7		0	7	0
6,151,552		20		0	20	23
6,150,546		3		3	6	4
6,149,534		17		1	18	84
6,148,528		9		5	14	18
6,147,521		15		2	17	15
6,146,511		18		0	18	3
6,145,503		8		0	8	3
6,144,493		9		2	11	15
6,143,484		19		1	20	3
6,142,472		19		0	19	3
6,141,467		2		10	12	17
6,140,465		6		19	25	0
6,139,463		6		0	6	54
6,138,462		24		0	24	10
6,137,460		11		0	11	0
6,136,457		5		9	14	3
6,135,453		31		0	31	21
6,134,448		9		0	9	31
6,133,442		12		4	16	16
6,132,433		13		12	25	43
6,131,431		7		1	8	1
6,130,429		2		2	4	2
6,129,424		6		0	6	1
6,128,422		9		10	19	6

3.2A (cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,127,418		3		4	7	18
6,126,412		11		0	11	1
6,125,409		10		3	13	15
6,124,407		7		0	7	17
6,123,399		10		0	10	7
6,122,397		23		26	49	19
6,121,394		30		5	35	8
6,120,387		7		0	7	5
6,119,382		3		0	3	3
6,118,377		18		0	18	1
6,117,420		8		0	8	0
6,116,417		15		0	15	11
6,115,414		7		0	7	1
6,113,408		4		0	4	2
6,112,406		10		5	15	0
6,111,401		10		0	10	2
6,110,396		10		0	10	4
6,109,394		8		0	8	2
6,108,392		12		0	12	4
6,107,385		6		0	6	3
6,106,379		50		0	50	16
6,104,372		13		0	13	2
6,103,363		10		2	12	51
6,102,359		6		0	6	0
6,101,356		5		0	5	16
6,100,351		45		5	50	8
6,099,346		11		0	11	56
6,098,344		27		0	27	16
6,097,340		2		0	2	6
6,096,330		8		4	12	0
6,095,328		9		0	9	4
6,094,321		23		0	23	3
6,093,320		11		0	11	1
6,092,313		9		0	9	3
6,091,311		6		11	17	7
6,090,304		40		7	47	25
6,089,300		37		3	40	4
6,088,296		3		0	3	5
6,087,290		5		3	8	3
6,086,283		15		0	15	7

3.2A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,085,277		9		2	11	45
6,084,273		12		2	14	5
6,083,266		6		2	8	8
6,081,259		14		0	14	4
6,081,258		8		0	8	0
6,080,254		10		0	10	4
6,079,250		3		0	3	7
6,078,245		6		0	6	12
6,077,241		20		1	21	7
6,076,238		27		0	27	8
6,075,234		2		0	2	2
6,074,231		5		0	5	5
6,073,228		10		0	10	10
6,072,226		20		1	21	9
6,071,219		66		3	69	18
6,070,216		7		0	7	0
6,069,209		0		16	16	3
6,068,204		2		0	2	8
6,067,249		11		0	11	12
6,066,244		16		1	17	0
6,065,242		86		4	90	2
6,064,235		8		0	8	4
6,063,233		83		8	91	28
6,062,231		11		0	11	13
6,061,229		5		0	5	10
6,060,225		8		0	8	2
6,058,222		5		0	5	5
6,057,218		1		0	1	1
6,055,211		3		0	3	1
6,053,209		9		0	9	1
6,047,185		12		1	13	2
6,041,160		5		0	5	1
6,038,149		11		0	11	21
6,035,142		9		0	9	1
6,033,133		9		0	9	1
6,031,126		7		3	10	0
6,027,109		3		0	3	3
6,018,072		7		0	7	0
6,016,112		4		2	6	13
6,012,096		2		1	3	46
6,015,565		3		4	7	0

3.2B Business method patents quality indicators (Year 2000)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,012,036	3		0	3	0
6,012,040	16		0	16	11
6,012,044	54		18	72	53
6,012,046	56		18	74	94
6,012,047	23		14	37	18
6,012,050	4		2	6	21
6,012,051	28		9	37	105
6,012,143	9		0	9	25
6,014,627	7		63	70	72
6,014,630	7		2	9	16
6,014,632	5		23	28	13
6,014,633	20		2	22	18
6,014,634	48		16	64	183
6,014,635	27		11	38	45
6,014,636	17		0	17	85
6,014,637	26		181	207	37
6,014,638	14		3	17	207
6,014,640	3		8	11	4
6,014,641	7		27	34	41
6,014,642	13		4	17	8
6,014,643	18		1	19	152
6,014,646	6		6	12	33
6,014,648	54		0	54	15
6,014,649	11		1	12	19
6,014,651	59		0	59	57
6,016,479	19		28	47	31
6,016,481	25		0	25	16
6,016,482	6		0	6	72
6,016,483	58		34	92	63
6,018,713	6		3	9	49
6,018,714	16		17	33	52
6,018,715	8		3	11	49
6,018,718	11		28	39	62
6,018,719	8		5	13	21
6,018,721	9		3	12	23
6,018,722	15		14	29	118
6,018,723	61		15	76	19
6,018,724	4		0	4	81
6,021,392	7		0	7	85
6,021,396	2		7	9	8

3.2B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,021,397		51		33	84	173
6,021,398		10		7	17	82
6,023,508		7		1	8	7
6,023,572		5		2	7	22
6,023,679		12		10	22	27
6,023,680		18		14	32	12
6,023,682		9		3	12	24
6,023,683		26		23	49	110
6,023,685		15		4	19	65
6,023,687		9		4	13	13
6,023,690		17		0	17	3
6,026,366		16		5	21	12
6,026,374		5		8	13	30
6,026,379		68		390	458	93
6,026,382		5		4	9	20
6,026,383		3		18	21	74
6,029,141		10		9	19	356
6,029,142		120		77	197	30
6,029,149		13		0	13	92
6,029,152		4		0	4	5
6,029,154		65		56	121	31
6,032,132		9		7	16	56
6,032,133		8		45	53	81
6,032,134		6		3	9	35
6,035,277		14		0	14	9
6,035,278		14		11	25	14
6,035,283		14		4	18	46
6,035,288		8		5	13	58
6,038,537		3		5	8	9
6,038,547		9		6	15	51
6,041,305		2		0	2	7
6,041,310		11		4	15	51
6,041,315		27		25	52	57
6,044,351		12		2	14	2
6,044,358		18		1	19	3
6,044,361		12		7	19	9
6,047,269		7		0	7	30
6,047,274		12		2	14	53
6,049,774		32		8	40	24
6,049,778		17		6	23	80

3.2B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,049,782		11		20	31	58
6,052,670		26		177	203	17
6,052,673		7		21	28	23
6,055,504		7		2	9	20
6,055,513		49		20	69	195
6,055,517		1		2	3	23
6,058,369		6		0	6	8
6,058,373		3		3	6	91
6,058,374		57		0	57	43
6,058,378		76		11	87	88
6,058,379		47		3	50	173
6,058,384		6		0	6	19
6,061,660		56		2	58	143
6,061,669		6		4	10	0
6,064,967		12		8	20	21
6,064,974		10		31	41	6
6,064,980		8		1	9	167
6,064,985		10		4	14	56
6,064,987		80		48	128	49
6,067,523		35		3	38	21
6,067,528		4		0	4	19
6,070,145		8		6	14	29
6,070,148		9		2	11	22
6,070,152		4		5	9	7
6,073,104		5		9	14	46
6,073,108		11		8	19	37
6,073,113		3		2	5	30
6,073,117		6		3	9	32
6,073,124		27		7	34	111
6,075,858		37		0	37	6
6,076,067		0		2	2	14
6,076,072		13		21	34	85
6,078,890		12		8	20	12
6,078,899		25		0	25	18
6,078,904		10		19	29	67
6,078,906		12		20	32	64
6,081,790		12		2	14	72
6,085,164		5		3	8	30
6,085,169		64		156	220	65
6,085,175		0		1	1	37

3.2B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
6,085,182	6	0	6	9	
6,088,676	5	1	6	10	
6,092,047	1	1	2	13	
6,092,050	12	3	15	21	
6,092,056	10	5	15	71	
6,094,639	3	1	4	4	
6,098,049	16	0	16	4	
6,098,054	12	5	17	6	
6,101,486	9	5	14	88	
6,104,999	15	6	21	14	
6,105,005	9	0	9	23	
6,105,014	45	0	45	16	
6,108,636	14	0	14	23	
6,108,643	8	0	8	17	
6,112,181	312	149	461	306	
6,112,188	1	5	6	24	
6,115,641	22	3	25	13	
6,115,691	24	4	28	30	
6,115,697	13	5	18	7	
6,119,093	7	6	13	44	
6,119,097	11	4	15	37	
6,119,102	15	17	32	27	
6,119,107	11	15	26	19	
6,122,623	9	13	22	39	
6,125,349	8	1	9	31	
6,125,354	12	14	26		
6,128,600	11	5	16	42	
6,131,087	27	3	30	126	
6,134,531	9	8	17	24	
6,138,102	8	8	16	7	
6,141,648	4	8	12	12	
6,141,650	3	0	3	5	
6,144,942	22	0	22	26	
6,144,944	23	10	33	77	
6,144,949	1	0	1	33	
6,148,290	10	5	15	33	
6,151,582	24	3	27	165	
6,151,585	8	4	12	10	
6,154,725	16	7	23	10	
6,154,729	8	5	13	6	

3.3A General Patents Quality Indicators (Year 2001)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,334,219	278		103	381	28
6,333,263	4		0	4	2
6,332,258	32		18	50	0
6,331,251	17		6	23	9
6,330,239	7		2	9	23
6,329,227	8		0	8	1
6,328,222	14		0	14	3
6,327,215	6		0	6	6
6,326,212	8		0	8	11
6,325,205	11		0	11	2
6,324,199	5		13	18	5
6,323,195	9		13	22	0
6,322,192	13		0	13	17
6,321,189	9		3	12	10
6,321,188	33		1	34	7
6,319,179	35		0	35	8
6,318,174	11		0	11	5
6,317,169	13		0	13	5
6,316,158	3		8	11	20
6,315,152	16		0	16	9
6,314,147	0		5	5	70
6,313,139	5		9	14	1
6,312,134	12		0	12	56
6,311,127	1		0	1	13
6,310,123	14		3	17	4
6,309,115	12		0	12	0
6,308,112	7		1	8	0
6,307,111	26		2	28	4
6,306,102	5		0	5	0
6,305,098	14		0	14	0
6,304,092	3		0	3	8
6,303,084	3		0	3	0
6,301,073	20		1	21	7
6,300,069	3		17	20	1
6,299,062	7		3	10	34
6,298,059	6		3	9	5
6,297,057	14		4	18	6
6,296,055	5		0	5	4
6,293,043	39		0	39	6
6,292,039	2		0	2	1

3.3A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,291,036		53		5	58	5
6,290,026		8		0	8	1
6,289,022		25		0	25	7
6,288,014		10		0	10	0
6,287,010		18		0	18	0
6,286,008		5		0	5	13
6,285,004		10		0	10	0
6,283,046		3		0	3	1
6,282,041		17		4	21	6
6,281,034		11		1	12	4
6,280,030		2		0	2	18
6,279,026		4		3	7	2
6,278,022		8		1	9	1
6,277,018		26		0	26	27
6,276,015		3		0	3	0
6,274,003		16		0	16	2
6,273,000		16		0	16	0
6,270,996		44		83	127	5
6,269,993		10		0	10	5
6,268,990		10		0	10	6
6,267,988		4		5	9	5
6,266,985		3		0	3	0
6,265,979		6		0	6	4
6,264,976		42		1	43	16
6,263,973		29		0	29	1
6,262,971		20		0	20	6
6,261,959		27		0	27	40
6,260,955		168		3	171	0
6,259,953		16		1	17	4
6,257,946		12		0	12	5
6,256,939		11		0	11	6
6,255,936		7		1	8	3
6,254,933		24		3	27	3
6,253,927		4		0	4	2
6,252,924		2		0	2	26
6,251,920		302		275	577	8
6,250,914		7		0	7	0
6,249,912		20		0	20	4
6,248,909		8		15	23	4
6,247,904		3		0	3	1

3.3A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,246,901		39		4	43	10
6,244,890		19		0	19	10
6,243,887		6		0	6	1
6,241,879		13		0	13	2
6,239,873		7		0	7	4
6,237,860		16		1	17	5
6,235,850		17		0	17	5
6,233,889		11		0	11	3
6,232,885		10		0	10	7
6,230,871		4		0	4	4
6,226,856		12		0	12	40
6,224,849		4		3	7	2
6,223,845		10		0	10	2
6,221,834		20		3	23	2
6,219,824		5		0	5	3
6,215,799		15		0	15	4
6,213,792		9		0	9	0
6,212,789		16		1	17	0
6,210,782		2		0	2	5
6,208,772		25		16	41	3
6,206,765		6		0	6	1
6,205,763		2		0	2	1
6,197,719		4		0	4	7
6,193,704		12		0	12	7
6,190,690		2		0	2	2
6,188,682		9		1	10	16
6,186,671		7		0	7	4
6,184,662		7		1	8	5
6,183,707		12		0	12	5
6,181,698		4		1	5	80
6,179,682		2		7	9	15
6,177,675		5		4	9	13
6,175,671		11		3	14	71
6,173,664		8		0	8	10
6,172,661		7		0	7	4
6,170,651		10		0	10	25
6,168,638		12		2	14	3
6,167,636		8		2	10	1

3.3B Business method patents quality indicators (Year 2001)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Patent and Nonpatent References)	
6,169,976	12	3	15	50	
6,169,979	20	8	28	34	
6,173,267	24	0	24	55	
6,173,269	57	6	63	70	
6,173,273	12	1	13	5	
6,175,823	8	10	18	60	
6,178,406	4	6	10	13	
6,182,047	6	2	8	16	
6,182,052	3	19	22	74	
6,183,140	0	7	7	5	
6,185,540	10	4	14	26	
6,185,543	12	28	40	22	
6,185,545	32	8	40	60	
6,188,989	22	4	26	25	
6,188,993	16	31	47	16	
6,188,997	12	2	14	9	
6,192,346	4	6	10	13	
6,192,349	8	3	11	34	
6,195,643	6	2	8	12	
6,195,647	20	9	29	78	
6,199,050	36	26	62	35	
6,199,054	38	2	40	21	
6,202,051	58	25	83	80	
6,202,054	204	126	330	95	
6,205,431	8	24	32	40	
6,208,973	10	18	28	60	
6,208,977	17	3	20	27	
6,212,505	10	1	11	6	
6,216,108	9	4	13	16	
6,216,115	11	6	17	29	
6,219,650	9	5	14	12	
6,223,164	59	80	139	17	
6,223,169	13	1	14	5	
6,226,620	39	8	47	16	
6,230,145	1	6	7	8	
6,230,149	33	2	35	1	
6,233,563	14	1	15	4	
6,233,567	13	1	14	25	
6,235,176	32	15	47	9	
6,236,972	8	4	12	75	

3.3B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				(Prior Patent and Nonpatent References)		
6,236,977		5		8	13	132
6,240,393		5		0	5	32
6,240,397		13		4	17	12
6,240,403		58		1	59	10
6,243,688		15		3	18	80
6,243,692		22		4	26	54
6,246,992		9		0	9	76
6,246,997		14		1	15	24
6,247,000		28		11	39	37
6,249,769		11		3	14	19
6,249,773		11		3	14	44
6,249,777		50		2	52	37
6,253,186		26		12	38	11
6,253,188		6		2	8	76
6,253,191		2		15	17	6
6,256,613		11		3	14	9
6,260,020		12		4	16	6
6,260,025		11		1	12	15
6,260,029		11		1	12	6
6,263,314		19		13	32	18
6,263,317		11		14	25	40
6,263,323		11		4	15	3
6,266,645		7		7	14	24
6,266,648		55		24	79	21
6,266,652		10		2	12	38
6,269,343		45		35	80	81
6,269,346		28		3	31	17
6,269,349		5		6	11	4
6,272,467		10		0	10	49
6,272,471		6		5	11	11
6,272,474		2		4	6	84
6,275,807		59		17	76	10
6,275,811		8		15	23	16
6,278,977		15		11	26	37
6,278,980		24		1	25	5
6,282,514		18		5	23	8
6,282,520		45		16	61	20
6,282,524		12		1	13	6
6,285,983		18		5	23	37
6,285,987		13		8	21	78

3.3B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,289,316		5		2	7	4
6,289,321		10		7	17	4
6,292,783		10		0	10	17
6,292,786		212		75	287	65
6,292,789		16		7	23	63
6,295,521		24		2	26	12
6,298,328		21		3	24	14
6,298,332		4		5	9	14
6,298,336		17		2	19	75
6,301,564		6		4	10	7
6,301,568		8		2	10	2
6,304,849		52		6	58	8
6,304,853		24		27	51	8
6,304,858		6		18	24	48
6,308,159		8		1	9	6
6,308,165		12		2	14	7
6,311,162		38		6	44	10
6,311,166		22		7	29	3
6,314,404		10		3	13	5
6,317,720		8		2	10	12
6,317,725		15		1	16	7
6,317,729		12		3	15	13
6,321,202		13		6	19	27
6,321,206		6		9	15	26
6,321,211		15		4	19	39
6,324,516		10		3	13	8
6,324,522		60		15	75	101
6,327,570		32		1	33	89
6,327,576		11		1	12	36
6,330,541		7		1	8	11
6,330,548		87		51	138	11

3.4A General patents quality indicators (Year 2002)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
6,502,243	9		5		10
6,501,289	11		0		55
6,500,281	3		0		0
6,499,280	8		0		6
6,498,276	7		0		0
6,497,267	9		0		12
6,496,264	9		0		4
6,495,257	15		0		1
6,494,253	10		0		3
6,493,249	14		0		15
6,492,235	4		0		0
6,491,230	17		0		15
6,490,228	3		0		2
6,489,224	52		0		19
6,488,220	6		0		1
6,487,213	6		0		1
6,486,204	6		19		4
6,485,198	9		0		0
6,484,193	4		0		0
6,483,189	7		0		1
6,482,184	9		0		0
6,481,180	14		0		17
6,480,179	7		0		2
6,479,173	10		17		1
6,478,170	16		0		4
6,477,165	2		0		8
6,476,162	10		2		0
6,475,160	19		0		0
6,474,159	2		9		4
6,473,157	39		0		4
6,472,151	8		1		0
6,471,145	3		0		2
6,470,137	12		0		0
6,469,132	9		13		2
6,468,129	12		2		3
6,467,127	1		0		1
6,466,121	3		0		2
6,465,111	25		2		0
6,464,109	4		0		3
6,463,106	9		0		6

3.4A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,462,101		2		0	2	0
6,461,095		13		0	13	19
6,460,091		18		0	18	0
6,459,079		15		0	15	10
6,458,071		8		10	18	4
6,457,069		11		0	11	19
6,456,063		39		0	39	5
6,455,056		5		3	8	1
6,454,053		12		0	12	1
6,453,052		9		0	9	4
6,452,099		23		0	23	4
6,451,093		2		0	2	3
6,450,090		13		2	15	1
6,449,084		10		0	10	34
6,448,079		2		5	7	0
6,447,072		22		0	22	2
6,446,068		12		17	29	16
6,445,063		42		0	42	7
6,444,061		4		0	4	1
6,443,057		15		0	15	0
6,442,054		2		0	2	14
6,441,049		4		14	18	7
6,440,045		15		0	15	9
6,439,043		10		0	10	0
6,438,041		4		0	4	7
6,437,037		17		1	18	5
6,436,031		26		0	26	2
6,435,025		14		0	14	5
6,434,020		23		1	24	10
6,433,015		6		0	6	2
6,432,010		8		0	8	0
6,431,007		3		2	5	2
6,430,004		2		0	2	1
6,428,997		8		15	23	3
6,427,994		4		0	4	0
6,426,990		11		0	11	5
6,425,987		5		4	9	2
6,424,985		4		0	4	1
6,423,979		3		0	3	1
6,422,977		10		0	10	22

3.4A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,421,973		21		2	23	6
6,420,970		12		0	12	0
6,419,965		14		4	18	2
6,418,961		7		2	9	1
6,417,958		8		12	20	18
6,416,954		1		7	8	0
6,415,951		7		0	7	0
6,414,948		11		1	12	11
6,413,943		5		34	39	0
6,412,934		34		0	34	9
6,410,924		14		0	14	12
6,409,916		8		0	8	3
6,406,901		29		15	44	0
6,405,896		12		0	12	1
6,404,894		3		0	3	0
6,403,890		17		0	17	3
6,402,886		25		1	26	1
6,401,934		178		15	193	1
6,400,932		9		5	14	5
6,397,914		5		0	5	0
6,393,886		3		0	3	5
6,391,869		7		12	19	5
6,390,855		10		0	10	9
6,388,834		8		0	8	1
6,386,806		12		0	12	0
6,384,789		4		2	6	10
6,382,776		2		0	2	0
6,381,770		7		0	7	14
6,379,757		16		1	17	8
6,377,746		9		0	9	0
6,375,737		1		0	1	8
6,373,731		4		0	4	2
6,371,728		4		0	4	1
6,370,722		34		0	34	6
6,366,702		9		0	9	2
6,362,681		2		1	3	1
6,361,672		3		1	4	5
6,357,647		9		0	9	11
6,355,639		3		10	13	0
6,353,628		8		0	8	7

3.4B Business method patents quality indicators (Year 2002)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,336,094	21		16	37	5
6,336,100	9		3	12	25
6,336,105	31		10	41	25
6,338,039	25		3	28	6
6,338,044	17		1	18	35
6,338,048	12		1	13	34
6,339,761	4		1	5	20
6,339,765	16		6	22	8
6,341,265	20		3	23	24
6,341,270	73		32	105	12
6,343,272	16		8	24	16
6,345,256	65		5	70	211
6,345,262	13		5	18	4
6,347,301	14		5	19	8
6,347,306	7		6	13	25
6,349,288	16		7	23	3
6,349,292	15		5	20	9
6,351,735	140		56	196	18
6,353,811	10		7	17	27
6,356,873	15		2	17	6
6,356,877	11		1	12	1
6,360,205	24		21	45	30
6,360,209	14		9	23	11
6,363,354	14		1	15	0
6,363,357	10		4	14	17
6,363,360	14		5	19	5
6,363,365	8		3	11	23
6,366,889	12		2	14	28
6,366,892	18		1	19	4
6,370,510	25		28	53	27
6,370,515	6		2	8	12
6,370,517	25		6	31	1
6,374,227	6		16	22	15
6,374,230	12		31	43	10
6,377,932	25		3	28	10
6,377,935	141		58	199	11
6,377,940	15		5	20	12
6,381,577	27		2	29	41
6,381,582	17		31	48	26
6,385,589	16		0	16	26

3.4B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,385,592		17		35	52	37
6,385,597		16		2	18	0
6,389,400		29		4	33	42
6,393,404		19		10	29	3
6,393,406		6		25	31	35
6,393,412		6		1	7	23
6,397,192		9		8	17	11
6,397,196		5		1	6	1
6,401,070		5		14	19	13
6,401,076		10		1	11	3
6,401,079		7		18	25	31
6,405,173		7		1	8	42
6,405,176		16		12	28	14
6,405,180		17		4	21	16
6,408,278		7		2	9	28
6,408,282		12		4	16	123
6,411,935		15		9	24	13
6,411,938		4		4	8	10
6,411,943		87		160	247	18
6,415,259		25		8	33	26
6,415,264		21		14	35	4
6,415,268		2		5	7	3
6,418,413		8		3	11	16
6,418,417		2		12	14	18
6,421,648		7		1	8	5
6,421,652		5		3	8	1
6,424,948		10		10	20	10
6,424,954		35		7	42	35
6,427,138		15		2	17	2
6,430,536		12		2	14	6
6,430,540		15		1	16	1
6,434,531		28		8	36	38
6,434,534		14		28	42	10
6,438,526		21		19	40	16
6,438,529		27		1	28	7
6,442,526		20		30	50	33
6,442,529		26		7	33	55
6,442,533		59		8	67	35
6,446,044		21		3	24	8
6,446,048		31		22	53	21

3.5A General patents quality indicators (Year 2003)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,671,883		5		0	5	2
6,670,927		10		0	10	0
6,669,922		5		1	6	0
6,668,917		25		0	25	3
6,667,911		2		0	2	0
6,666,905		10		0	10	1
6,665,902		7		0	7	1
6,664,899		8		0	8	5
6,663,896		15		0	15	0
6,662,891		20		0	20	12
6,661,888		4		0	4	4
6,660,885		66		12	78	1
6,659,884		19		1	20	3
6,658,882		5		0	5	0
6,657,881		4		0	4	3
6,656,878		11		0	11	0
6,655,875		8		0	8	2
6,654,873		6		1	7	2
6,653,870		2		3	5	2
6,652,866		6		0	6	0
6,651,864		52		7	59	7
6,650,860		19		0	19	3
6,649,857		19		0	19	0
6,648,851		8		1	9	0
6,647,847		11		1	12	44
6,646,839		14		0	14	4
6,645,834		12		1	13	4
6,644,828		9		0	9	2
6,643,826		10		0	10	2
6,642,816		2		0	2	0
6,641,807		4		19	23	0
6,640,803		18		0	18	3
6,639,796		8		0	8	4
6,638,790		2		0	2	11
6,637,786		13		0	13	1
6,636,784		13		1	14	1
6,635,776		19		20	39	1
6,634,771		13		1	14	7
6,633,767		17		0	17	1
6,632,763		8		4	12	0

3.5A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
6,631,760		407	6	413	75
6,630,751		43	2	45	6
6,629,744		9	2	11	2
6,628,742		16	6	22	5
6,627,736		2	17	19	0
6,626,730		8	0	8	0
6,625,727		16	0	16	2
6,624,725		4	0	4	0
6,623,721		10	29	39	0
6,622,718		6	0	6	0
6,621,767		35	11	46	7
6,620,763		7	0	7	0
6,619,762		12	0	12	0
6,618,759		7	0	7	2
6,617,755		21	0	21	6
6,616,753		19	2	21	17
6,615,749		13	0	13	0
6,614,745		12	1	13	8
6,613,739		62	11	73	7
6,612,733		16	0	16	4
6,611,729		7	1	8	1
6,610,724		16	12	28	0
6,609,715		21	0	21	1
6,608,710		12	2	14	3
6,607,704		28	0	28	1
6,606,702		5	0	5	7
6,605,698		7	12	19	0
6,604,692		1	0	1	3
6,603,689		7	0	7	4
6,602,683		4	7	11	0
6,600,674		4	1	5	3
6,599,668		7	2	9	0
6,598,661		10	0	10	0
6,597,659		5	0	5	2
6,596,654		5	0	5	53
6,595,651		11	0	11	10
6,591,635		7	1	8	0
6,590,630		7	0	7	4
6,588,621		34	0	34	3
6,587,616		10	5	15	1

3.5A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
6,586,609	3		6		0
6,585,606	8		0		3
6,584,603	5		0		2
6,583,595	2		0		5
6,582,590	7		0		11
6,581,586	2		0		3
6,579,578	4		0		1
6,577,571	4		0		6
6,575,564	8		0		2
6,574,560	5		0		1
6,573,556	4		0		2
6,571,597	19		0		0
6,569,591	17		16		0
6,567,580	11		0		1
6,566,574	8		17		10
6,563,566	16		6		30
6,562,564	1		46		0
6,559,544	9		0		2
6,557,534	5		0		0
6,556,529	9		1		1
6,554,518	4		0		1
6,551,506	8		0		1
6,550,502	8		0		2
6,548,492	7		2		1
6,546,486	12		1		3
6,544,475	95		0		10
6,542,465	20		6		13
6,541,460	12		4		1
6,539,447	5		1		3
6,537,437	9		4		26
6,535,431	7		0		1
6,533,418	11		0		10
6,526,373	3		55		8
6,524,365	7		0		2
6,519,390	5		3		5
6,515,371	4		1		5
6,513,362	3		0		5
6,511,347	10		0		6
6,508,332	19		0		2
6,504,309	3		0		0

3.5B Business method patents quality indicators (Year 2003)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
				and	
				References)	
6,505,164	6	2	8	2	
6,505,168	128	22	150	32	
6,505,174	17	1	18	35	
6,505,178	6	0	6	2	
6,507,821	6	6	12	1	
6,507,826	5	8	13	5	
6,510,418	73	84	157	26	
6,513,013	6	2	8	16	
6,513,018	5	17	22	26	
6,516,300	36	20	56	0	
6,519,570	90	64	154	17	
6,519,573	4	4	8	7	
6,523,009	12	0	12	9	
6,523,011	9	8	17	3	
6,523,014	22	2	24	8	
6,526,386	2	2	4	3	
6,526,391	46	5	51	6	
6,529,876	5	3	8	10	
6,529,879	9	2	11	2	
6,529,885	22	8	30	30	
6,532,448	19	2	21	11	
6,532,452	40	1	41	5	
6,535,856	9	0	9	0	
6,539,362	56	17	73	7	
6,542,871	6	13	19	8	
6,542,874	32	42	74	11	
6,546,373	8	5	13	35	
6,546,377	37	5	42	18	
6,549,890	17	1	18	7	
6,553,348	40	3	43	3	
6,553,350	6	5	11	13	
6,553,353	14	1	15	3	
6,556,974	13	15	28	19	
6,556,976	20	1	21	10	
6,560,578	75	2	77	31	
6,564,188	14	5	19	2	
6,564,191	4	2	6	5	
6,567,783	14	6	20	15	
6,567,786	20	10	30	26	
6,567,789	2	6	8	3	

3.5B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,571,216		8		1	9	17
6,571,219		3		7	10	16
6,571,223		12		1	13	0
6,574,606		20		7	27	9
6,574,610		6		2	8	0
6,578,002		39		1	40	7
6,578,003		19		5	24	4
6,578,008		5		28	33	9
6,578,014		24		2	26	23
6,581,037		10		1	11	2
6,581,041		9		5	14	5
6,584,446		18		3	21	4
6,584,447		36		29	65	20
6,584,451		33		25	58	17
6,587,827		11		2	13	30
6,587,831		14		10	24	13
6,587,834		6		2	8	5
6,587,838		74		54	128	15
6,587,843		8		1	9	4
6,591,246		7		2	9	2
6,591,251		46		8	54	3
6,594,633		11		1	12	31
6,594,636		10		4	14	1
6,594,640		8		9	17	25
6,594,647		8		1	9	7
6,598,024		82		43	125	23
6,598,027		20		7	27	30
6,598,031		5		1	6	11
6,601,033		4		1	5	6
6,601,037		117		9	126	6
6,604,079		16		3	19	6
6,604,084		26		14	40	7
6,606,602		46		5	51	28
6,606,607		12		2	14	9
6,609,100		37		10	47	14
6,609,106		15		16	31	45
6,609,109		7		7	14	7
6,609,117		18		3	21	3
6,611,806		6		3	9	3
6,611,812		66		6	72	77

3.6A General patents quality indicators (Year 2004)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent		
6,836,898		14		0	14	0
6,835,943		9		0	9	1
6,834,940		17		0	17	1
6,833,935		12		3	15	0
6,832,932		4		0	4	0
6,831,928		72		8	80	3
6,830,923		4		8	12	0
6,829,917		14		0	14	3
6,828,910		6		0	6	3
6,827,903		11		3	14	1
6,826,899		12		0	12	0
6,825,893		7		0	7	3
6,824,887		8		1	9	0
6,823,880		12		0	12	4
6,822,873		7		2	9	0
6,821,866		11		0	11	2
6,820,855		9		0	9	2
6,819,848		8		1	9	1
6,818,842		10		0	10	14
6,817,839		13		0	13	0
6,816,825		6		15	21	14
6,815,819		13		0	13	1
6,814,815		28		2	30	2
6,813,812		13		0	13	4
6,812,818		6		1	7	0
6,811,813		17		3	20	3
6,810,817		16		3	19	2
6,809,802		6		0	6	10
6,808,794		3		0	3	1
6,807,793		10		1	11	1
6,806,785		3		7	10	7
6,805,779		30		24	54	6
6,804,777		3		0	3	2
6,803,774		4		0	4	8
6,802,767		15		0	15	0
6,801,766		5		0	5	0
6,800,761		6		2	8	3
6,799,754		11		0	11	0
6,798,752		4		1	5	3
6,797,746		6		2	8	0

3.6A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
6,796,742	14		0	14	1
6,795,738	4		4	8	0
6,794,731	13		6	19	0
6,793,716	24		0	24	5
6,792,699	13		0	13	3
6,791,689	22		3	25	15
6,790,681	3		0	3	1
6,789,667	5		0	5	7
6,788,661	17		4	21	16
6,787,656	14		0	14	0
6,786,694	14		0	14	0
6,785,688	19		8	27	5
6,784,681	4		0	4	2
6,783,671	10		0	10	0
6,782,662	13		0	13	1
6,781,656	11		3	14	1
6,780,645	16		4	20	26
6,779,635	32		0	32	1
6,778,631	4		0	4	5
6,777,626	10		0	10	3
6,776,618	9		0	9	1
6,775,614	16		0	16	0
6,774,609	3		0	3	1
6,773,602	5		0	5	0
6,772,594	8		1	9	2
6,771,590	4		1	5	4
6,770,584	12		0	12	11
6,769,580	8		0	8	3
6,768,576	28		0	28	1
6,767,568	28		0	28	1
6,766,563	17		0	17	2
6,765,557	44		1	45	12
6,764,551	4		0	4	0
6,763,547	13		0	13	0
6,762,543	32		4	36	7
6,761,536	6		0	6	1
6,760,532	14		0	14	3
6,759,530	2		48	50	0
6,758,520	35		0	35	0
6,757,515	28		1	29	18

3.6A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)		
6,756,509		2		1	3	1
6,755,504		11		0	11	1
6,754,496		32		0	32	1
6,753,489		11		0	11	0
6,752,478		40		0	40	4
6,751,474		17		0	17	5
6,750,469		4		0	4	15
6,749,462		5		0	5	2
6,748,455		85		72	157	17
6,747,452		13		0	13	4
6,746,442		124		3	127	6
6,745,435		14		0	14	1
6,744,431		10		0	10	0
6,743,420		1		0	1	1
6,742,409		3		0	3	3
6,741,406		13		2	15	9
6,740,396		8		1	9	2
6,739,392		651		88	739	66
6,738,390		8		6	14	14
6,737,387		13		0	13	2
6,736,433		12		0	12	0
6,735,428		11		1	12	1
6,733,418		7		0	7	0
6,731,406		3		0	3	1
6,727,389		1		0	1	2
6,724,372		8		0	8	5
6,722,361		14		0	14	0
6,718,341		9		0	9	1
6,713,316		8		0	8	0
6,711,310		11		0	11	2
6,709,303		4		0	4	10
6,706,291		8		0	8	0
6,704,284		8		0	8	18
6,702,277		7		0	7	0
6,700,272		22		3	25	4
6,698,262		14		0	14	9
6,694,251		2		0	2	1
6,692,240		15		0	15	5
6,690,232		7		2	9	59
6,685,266		17		0	17	3

3.6B Business method patents quality indicators (Year 2004)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,675,149		11		1	12	11
6,675,151		24		31	55	8
6,678,663		8		2	10	6
6,681,210		7		5	12	0
6,684,189		26		51	77	7
6,684,193		11		8	19	20
6,684,197		119		13	132	2
6,684,200		4		3	7	4
6,687,676		14		6	20	1
6,687,681		10		2	12	4
6,687,684		8		1	9	9
6,691,094		10		3	13	9
6,694,299		7		16	23	3
6,694,300		141		59	200	31
6,697,783		18		7	25	15
6,697,786		4		1	5	1
6,697,787		24		87	111	6
6,701,303		9		3	12	5
6,704,713		54		8	62	10
6,704,716		30		12	42	12
6,708,156		15		17	32	5
6,711,548		0		4	4	4
6,711,553		16		3	19	9
6,714,914		21		2	23	4
6,714,916		10		17	27	13
6,714,919		31		4	35	1
6,714,922		21		3	24	0
6,718,310		7		2	9	2
6,718,312		4		1	5	21
6,718,314		3		0	3	7
6,721,714		9		14	23	9
6,725,201		10		31	41	1
6,725,203		9		3	12	14
6,728,684		9		1	10	0
6,732,079		10		2	12	6
6,732,153		20		10	30	6
6,735,568		16		5	21	18
6,735,570		18		14	32	10
6,735,571		5		3	8	4
6,735,573		23		3	26	2

3.6B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,738,746		16		6	22	4
6,738,751		6		1	7	0
6,741,967		12		2	14	28
6,741,972		27		3	30	3
6,748,364		8		0	8	7
6,748,367		9		4	13	15
6,751,596		8		10	18	4
6,754,634		1		0	1	7
6,754,636		133		43	176	24
6,754,639		23		18	41	3
6,754,642		173		29	202	3
6,757,660		4		1	5	3
6,757,664		11		1	12	6
6,760,706		21		1	22	0
6,760,709		7		19	26	2
6,760,710		5		0	5	0
6,760,711		6		2	8	8
6,763,335		16		10	26	0
6,766,302		16		6	22	2
6,766,307		24		28	52	8
6,768,981		55		14	69	3
6,772,128		4		6	10	2
6,772,131		10		4	14	5
6,775,655		61		38	99	35
6,778,968		28		8	36	8
6,782,369		17		3	20	3
6,782,370		19		12	31	18
6,782,371		5		4	9	0
6,785,658		3		4	7	0
6,785,660		11		3	14	4
6,785,661		16		7	23	13
6,789,067		8		2	10	4
6,789,068		6		2	8	5
6,792,399		1		46	47	38
6,792,410		4		4	8	2
6,792,411		1		16	17	6
6,795,809		9		1	10	7
6,795,811		16		3	19	5
6,795,812		21		9	30	2
6,799,165		12		10	22	4

3.7A General patents quality indicators (Year 2005)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,980,327	4		0	4	2
6,979,318	8		0	8	1
6,978,312	11		5	16	2
6,977,311	2		4	6	0
6,976,308	8		0	8	0
6,975,306	26		14	40	1
6,974,302	9		0	9	1
6,973,298	7		0	7	1
6,972,293	26		31	57	1
6,971,284	16		0	16	3
6,970,282	12		0	12	0
6,969,278	11		0	11	3
6,968,274	5		2	7	2
6,967,268	5		8	13	0
6,966,263	14		0	14	0
6,965,260	2		0	2	0
6,964,255	10		5	15	3
6,963,253	7		18	25	1
6,962,250	10		0	10	3
6,961,247	5		0	5	0
6,960,240	13		1	14	6
6,959,232	7		0	7	1
6,958,224	0		0	0	0
6,957,218	62		2	64	2
6,956,213	3		0	3	1
6,955,207	4		0	4	2
6,954,204	3		4	7	2
6,953,198	22		0	22	1
6,952,195	13		0	13	10
6,951,192	5		0	5	1
6,950,187	3		0	3	0
6,949,185	59		0	59	1
6,948,181	9		1	10	1
6,947,176	4		2	6	0
6,946,172	71		3	74	0
6,945,170	14		3	17	0
6,944,165	8		0	8	0
6,943,158	7		14	21	0
6,942,150	56		10	66	5
6,941,141	10		2	12	1

3.7A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,940,135		3		0	3	0
6,939,131		10		0	10	0
6,938,127		5		0	5	5
6,937,123		4		0	4	0
6,936,117		2		0	2	0
6,935,114		8		0	8	2
6,934,112		14		0	14	1
6,933,106		4		2	6	1
6,932,104		14		0	14	0
6,931,148		12		0	12	0
6,930,144		8		3	11	2
6,929,141		8		0	8	0
6,928,138		9		2	11	0
6,927,134		17		3	20	1
6,926,130		22		0	22	12
6,925,119		6		5	11	0
6,924,110		0		4	4	1
6,923,103		10		0	10	1
6,922,099		12		2	14	2
6,921,096		8		0	8	1
6,920,090		6		0	6	0
6,919,085		7		17	24	0
6,918,075		8		0	8	0
6,917,070		7		0	7	1
6,916,065		23		0	23	8
6,915,061		4		2	6	3
6,914,054		51		44	95	12
6,913,051		13		0	13	0
6,912,047		10		0	10	1
6,911,040		11		0	11	1
6,910,035		3		17	20	6
6,909,030		16		45	61	0
6,908,023		36		5	41	2
6,907,022		6		0	6	0
6,906,013		6		1	7	0
6,905,006		7		0	7	0
6,904,001		5		0	5	1
6,902,994		1		0	1	2
6,901,987		14		0	14	4
6,900,983		12		0	12	1

3.7B Business method patents quality indicators (Year 2005)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
6,839,656	9	7	16	2	
6,839,678	4	3	7	1	
6,839,680	11	18	29	54	
6,839,683	72	22	94	1	
6,839,689	9	6	15	1	
6,842,736	23	2	25	1	
6,845,361	4	2	6	5	
6,845,365	9	8	17	1	
6,847,934	6	2	8	2	
6,847,938	44	25	69	7	
6,847,943	2	1	3	1	
6,847,950	5	1	6	10	
6,850,890	11	9	20	1	
6,850,895	10	2	12	21	
6,850,900	26	35	61	13	
6,850,903	8	6	14	1	
6,850,907	69	400	469	45	
6,853,973	5	2	7	1	
6,853,980	6	6	12	23	
6,853,984	8	2	10	0	
6,853,987	14	5	19	12	
6,856,962	17	2	19	2	
6,856,967	36	20	56	12	
6,856,971	18	9	27	3	
6,856,975	0	1	1	4	
6,859,782	6	13	19	0	
6,859,785	5	7	12	6	
6,862,572	13	1	14	16	
6,862,577	21	1	22	1	
6,865,538	18	5	23	1	
6,865,542	7	13	20	6	
6,865,547	209	87	296	25	
6,865,561	36	4	40	0	
6,868,387	8	8	16	5	
6,868,393	14	9	23	2	
6,868,401	16	66	82	3	
6,868,407	15	2	17	1	
6,871,181	17	1	18	2	
6,871,189	11	2	13	0	
6,871,193	3	1	4	8	

3.7B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
6,873,959		9		3	12	0
6,873,964		5		1	6	12
6,873,971		5		4	9	5
6,876,971		32		8	40	19
6,876,975		9		1	10	2
6,876,983		6		1	7	11
6,879,959		8		0	8	6
6,882,980		6		10	16	3
6,882,985		7		2	9	1
6,885,994		259		24	283	2
6,889,196		27		1	28	7
6,889,202		6		2	8	0
6,889,209		10		1	11	9
6,892,178		14		27	41	2
6,892,184		17		1	18	2
6,895,381		9		3	12	4
6,895,386		12		0	12	8
6,895,391		12		0	12	1
6,898,570		64		115	179	5
6,898,573		2		4	6	0
6,898,577		8		1	9	13
6,898,581		35		22	57	1
6,901,370		2		1	3	0
6,901,383		3		4	7	7
6,901,387		54		2	56	6
6,904,407		9		1	10	4
6,904,414		10		8	18	0
6,904,419		15		1	16	1
6,907,399		25		20	45	1
6,907,405		20		9	29	9
6,910,017		30		27	57	20
6,910,021		8		11	19	3
6,911,133		12		1	13	0
6,912,502		9		0	9	13
6,912,508		5		11	16	0
6,912,514		9		1	10	1
6,915,265		19		1	20	7
6,915,270		8		1	9	0
6,915,273		8		3	11	8
6,915,280		8		1	9	0

3.7B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
6,917,922	17		2	19	8
6,920,428	10		1	11	2
6,920,432	13		18	31	2
6,920,438	42		2	44	0
6,922,671	8		5	13	1
6,922,677	19		8	27	2
6,925,440	4		7	11	1
6,925,446	12		1	13	0
6,928,416	11		9	20	1
6,934,686	8		16	24	3
6,934,692	26		22	48	6
6,937,989	2		4	6	1
6,937,995	53		2	55	5
6,938,001	3		1	4	1
6,938,006	13		10	23	3
6,938,012	3		4	7	1
6,938,021	532		696	1228	20
6,938,023	14		5	19	0
6,941,278	29		7	36	3
6,941,282	26		9	35	3
6,944,595	14		2	16	1
6,944,601	11		1	12	0
6,947,898	12		8	20	5
6,947,901	7		2	9	0
6,947,905	8		6	14	3
6,950,800	5		12	17	10
6,950,805	7		9	16	2
6,952,679	9		21	30	3
6,952,686	9		1	10	0
6,954,728	7		9	16	8
6,954,733	10		2	12	0
6,957,186	21		35	56	60
6,957,195	8		2	10	0
6,959,285	14		1	15	3
6,961,707	6		1	7	1
6,961,714	29		9	38	2
6,963,848	18		22	40	2
6,963,857	9		1	10	16
6,965,872	13		3	16	2
6,965,877	34		7	41	0

3.8A General Patents quality indicators (Year 2006)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
6,981,282	62	0	62	0	0
6,989,126	4	3	7	2	2
6,995,154	12	36	48	0	0
7,002,199	9	1	10	6	6
7,011,192	3	0	3	0	0
7,020,244	8	0	8	0	0
7,029,278	8	0	8	1	1
7,036,313	5	0	5	0	0
7,044,356	8	0	8	0	0
7,045,363	11	14	25	0	0
7,047,371	9	0	9	7	7
7,051,388	12	0	12	1	1
7,053,394	9	0	9	3	3
7,056,360	19	0	19	0	0
7,057,363	10	0	10	1	1
7,058,367	11	3	14	5	5
7,059,370	9	0	9	1	1
7,060,373	6	0	6	1	1
7,061,378	11	0	11	0	0
7,062,385	2	34	36	1	1
7,063,388	6	0	6	0	0
7,064,394	18	1	19	1	1
7,065,399	12	0	12	1	1
7,066,403	29	0	29	1	1
7,067,408	11	2	13	0	0
7,068,416	8	2	10	16	16
7,069,420	9	0	9	0	0
7,070,426	6	3	9	1	1
7,071,429	6	0	6	1	1
7,072,434	12	0	12	0	0
7,073,435	9	0	9	1	1
7,074,442	3	0	3	0	0
7,075,448	12	0	12	0	0
7,076,454	13	3	16	0	0
7,077,463	27	0	27	3	3
7,078,467	18	7	25	1	1
7,079,474	14	0	14	2	2
7,080,478	24	3	27	2	2
7,081,487	6	1	7	0	0
7,082,491	10	0	10	0	0

3.8A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
				(Prior Patent and Nonpatent References)	
7,083,496	9		0	9	1
7,084,498	12		0	12	0
7,085,500	15		3	18	1
7,086,503	15		0	15	5
7,087,508	10		0	10	0
7,088,515	1		0	1	0
7,089,518	8		0	8	6
7,090,523	19		0	19	13
7,091,528	14		5	19	0
7,092,535	4		0	4	0
7,093,541	27		0	27	0
7,094,547	7		16	23	0
7,095,557	12		0	12	0
7,096,564	15		0	15	1
7,097,566	2		0	2	0
7,098,571	165		36	201	5
7,099,577	2		2	4	0
7,100,580	19		0	19	3
7,101,587	128		8	136	18
7,102,590	5		0	5	0
7,103,596	9		2	11	1
7,104,601	19		0	19	2
7,105,605	4		0	4	0
7,106,561	14		3	17	5
7,107,569	7		0	7	1
7,108,575	2		0	2	0
7,109,577	3		0	3	2
7,110,580	4		0	4	1
7,111,586	10		0	10	0
7,112,589	14		8	22	0
7,113,595	2		5	7	0
7,114,600	14		0	14	0
7,115,604	11		7	18	0
7,116,612	10		1	11	3
7,117,617	79		0	79	3
7,118,618	7		2	9	0
7,119,624	23		27	50	1
7,120,628	45		0	45	1
7,121,633	19		0	19	1
7,122,638	4		87	91	0

3.8B Business method patents quality indicators (Yeas 2006)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
6,983,253	7		1	8	1
6,983,257	45		85	130	2
6,983,260	13		0	13	1
6,983,379	23		5	28	10
6,985,871	32		30	62	1
6,985,876	19		2	21	5
6,985,881	7		8	15	1
6,988,073	23		6	29	0
6,988,077	27		19	46	2
6,988,081	5		3	8	0
6,990,457	7		3	10	0
6,990,464	26		4	30	3
6,990,473	23		1	24	2
6,993,489	20		8	28	9
6,993,496	13		33	46	0
6,993,664	5		2	7	5
6,996,534	4		1	5	1
6,996,541	50		67	117	1
6,999,936	24		4	28	11
6,999,942	14		13	27	1
6,999,949	9		6	15	0
7,003,470	11		1	12	2
7,003,476	36		12	48	3
7,003,483	14		12	26	1
7,003,490	24		10	34	2
7,006,977	2		14	16	2
7,006,983	20		17	37	3
7,006,990	9		1	10	2
7,006,999	9		4	13	1
7,010,495	30		16	46	2
7,010,501	32		3	35	4
7,010,510	4		26	30	2
7,013,286	10		1	11	3
7,013,295	10		4	14	0
7,016,851	26		37	63	1
7,016,858	9		3	12	0
7,016,868	12		13	25	1
7,016,878	15		1	16	0
7,020,616	6		1	7	0
7,020,623	33		29	62	1

3.8B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,020,635		17		4	21	2
7,020,781		12		0	12	6
7,024,372		5		4	9	0
7,024,383		12		6	18	1
7,024,393		49		35	84	14
7,027,992		5		26	31	8
7,027,999		2		5	7	1
7,028,008		19		46	65	2
7,031,927		99		77	176	2
7,031,936		4		7	11	0
7,031,943		16		1	17	2
7,035,808		21		4	25	7
7,035,817		13		8	21	2
7,035,829		52		16	68	0
7,039,580		3		0	3	1
7,039,592		15		18	33	0
7,039,602		45		22	67	3
7,039,611		9		2	11	2
7,043,441		25		0	25	1
7,043,449		5		1	6	7
7,043,455		11		4	15	1
7,047,203		9		2	11	2
7,047,215		33		17	50	0
7,050,982		10		4	14	0
7,050,990		103		30	133	2
7,051,001		6		1	7	4
7,054,821		8		2	10	1
7,054,830		65		3	68	2
7,054,838		14		2	16	0
7,058,583		1		2	3	0
7,058,590		25		15	40	1
7,058,598		6		7	13	10
7,062,446		16		6	22	6
7,062,456		10		15	25	7
7,062,469		7		0	7	0
7,065,475		4		0	4	3
7,065,499		89		25	114	2
7,069,226		83		3	86	0
7,069,236		14		18	32	0
7,069,247		11		2	13	0

3.8B(Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
7,069,252		8	7	15	0
7,072,843		100	127	227	4
7,072,851		11	3	14	3
7,072,860		20	3	23	0
7,076,436		8	4	12	0
7,076,444		13	4	17	0
7,076,453		14	3	17	5
7,076,461		13	11	24	0
7,076,471		9	3	12	1
7,080,018		42	41	83	3
7,080,029		9	2	11	0
7,082,403		24	29	53	0
7,082,414		10	3	13	1
7,085,725		42	8	50	4
7,085,735		11	5	16	1
7,085,745		31	37	68	4
7,089,191		6	1	7	1
7,089,200		12	3	15	1
7,089,212		101	16	117	0
7,092,892		26	26	52	2
7,092,904		14	1	15	0
7,096,188		13	41	54	0
7,096,203		9	1	10	2
7,099,836		3	1	4	3
7,103,558		19	1	20	0
7,103,570		15	4	19	1
7,107,227		8	11	19	2
7,110,957		16	8	24	0
7,110,973		20	2	22	1
7,110,987		38	5	43	0
7,113,913		7	11	18	1
7,117,161		27	3	30	0
7,120,589		24	6	30	0
7,124,089		9	4	13	0
7,124,108		18	4	22	1
7,127,406		24	2	26	2
7,130,789		33	4	37	1
7,130,825		27	2	29	0
7,133,834		50	25	75	5
7,133,847		7	0	7	2

3.9A General patents quality indicators (Year 2007)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
7,510,189	17	0	17	1	
7,312,872	2	0	2	0	
7,311,865	6	0	6	0	
7,310,863	13	0	13	0	
7,309,856	5	0	5	0	
7,308,847	14	1	15	0	
7,307,841	10	3	13	1	
7,306,838	50	0	50	0	
7,305,830	11	0	11	0	
7,304,826	8	0	8	0	
7,303,823	12	0	12	0	
7,302,817	25	1	26	1	
7,301,813	65	14	79	0	
7,300,808	32	11	43	0	
7,299,803	17	1	18	0	
7,298,802	7	0	7	0	
7,297,792	10	7	17	0	
7,296,786	8	0	8	0	
7,295,784	9	2	11	0	
7,294,779	12	4	16	0	
7,293,775	29	0	29	0	
7,292,777	18	2	20	0	
7,291,768	7	7	14	0	
7,290,763	10	0	10	3	
7,289,756	28	0	28	0	
7,288,752	9	5	14	0	
7,287,744	32	1	33	1	
7,286,742	12	1	13	2	
7,285,736	3	0	3	0	
7,284,730	73	26	99	1	
7,283,713	12	0	12	0	
7,282,706	26	2	28	0	
7,281,709	9	0	9	0	
7,280,703	16	1	17	0	
7,279,699	44	10	54	0	
7,278,690	29	11	40	2	
7,277,696	22	1	23	1	
7,276,684	7	0	7	0	
7,275,676	85	2	87	0	
7,274,674	15	3	18	1	

3.9A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,273,668		10		0	10	0
7,272,664		23		0	23	1
7,271,657		14		1	15	0
7,270,653		79		7	86	0
7,269,651		93		28	121	0
7,268,643		33		1	34	0
7,267,637		251		0	251	0
7,266,634		166		64	230	24
7,265,628		3		0	3	2
7,264,622		301		58	359	0
7,263,646		13		1	14	0
7,262,640		6		0	6	0
7,261,634		14		0	14	0
7,260,625		27		2	29	0
7,259,621		1		0	1	0
7,258,614		0		35	35	0
7,257,606		26		8	34	1
7,256,601		1		0	1	0
7,255,583		12		0	12	0
7,254,577		5		9	14	1
7,253,572		2		0	2	0
7,252,565		11		1	12	0
7,251,559		21		2	23	1
7,250,557		5		9	14	0
7,249,549		23		4	27	0
7,248,544		6		0	6	0
7,247,533		3		0	3	0
7,246,525		4		1	5	0
7,245,516		5		0	5	0
7,244,509		43		0	43	0
7,243,506		17		17	34	0
7,242,500		9		0	9	0
7,241,493		184		4	188	0
7,240,487		17		0	17	0
7,239,485		18		1	19	1
7,238,478		7		10	17	0
7,237,471		4		0	4	0
7,236,460		5		4	9	2
7,235,453		10		0	10	0
7,234,448		10		13	23	0

3.9A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,233,444		3		0	3	0
7,232,435		39		10	49	0
7,231,430		32		0	32	6
7,230,425		11		0	11	1
7,229,417		257		49	306	0
7,228,414		7		1	8	0
7,227,406		6		0	6	0
7,226,398		8		0	8	0
7,225,387		22		3	25	1
7,224,381		25		0	25	0
7,223,374		14		2	16	0
7,222,370		11		0	11	0
7,221,365		13		4	17	1
7,220,359		8		0	8	1
7,219,358		6		0	6	1
7,218,350		6		0	6	0
7,217,337		27		0	27	0
7,216,335		8		6	14	0
7,215,332		10		1	11	0
7,214,327		19		0	19	0
7,213,371		12		0	12	0
7,211,358		4		0	4	0
7,205,319		3		6	9	0
7,203,306		3		0	3	1
7,191,222		8		0	8	0
7,185,172		4		1	5	2
7,183,154		2		0	2	0
7,174,099		5		5	10	1
7,167,070		10		0	10	0
7,162,100		7		0	7	1
7,158,085		9		0	9	0
7,155,746		312		11	323	0

3.9B Business method patents quality indicators (Year 2007)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,158,938		10		3	13	0
7,158,944		13		21	34	1
7,158,951		15		1	16	3
7,162,427		14		4	18	4
7,162,437		7		12	19	1
7,162,446		122		55	177	3
7,165,041		20		42	62	38
7,167,833		19		3	22	0
7,171,368		7		1	8	1
7,171,379		98		28	126	4
7,174,302		35		15	50	1
7,174,312		15		3	18	2
7,177,820		2		3	5	0
7,177,826		16		0	16	0
7,177,833		45		2	47	9
7,177,850		4		1	5	0
7,181,405		8		6	14	1
7,181,415		59		5	64	0
7,181,424		13		5	18	10
7,184,962		7		23	30	0
7,184,970		3		12	15	0
7,184,980		34		11	45	0
7,188,070		87		2	89	1
7,188,076		12		2	14	0
7,191,140		4		8	12	1
7,191,149		13		21	34	2
7,191,157		18		6	24	0
7,194,417		11		7	18	2
7,194,427		77		94	171	1
7,194,438		40		5	45	2
7,197,468		22		13	35	0
7,197,478		8		4	12	0
7,200,551		14		3	17	0
7,200,568		30		5	35	0
7,200,578		26		11	37	6
7,203,654		11		1	12	0
7,206,749		13		2	15	0
7,206,758		23		8	31	0
7,206,767		11		0	11	0
7,209,887		15		5	20	1

3.9B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,209,894		14		1	15	0
7,209,904		18		4	22	0
7,212,982		6		8	14	0
7,212,987		27		21	48	3
7,212,995		13		6	19	0
7,213,003		46		35	81	0
7,216,084		22		7	29	6
7,216,090		14		2	16	0
7,216,096		18		2	20	0
7,216,105		10		2	12	0
7,219,066		26		2	28	1
7,219,071		17		16	33	0
7,219,076		7		2	9	1
7,219,081		14		12	26	1
7,222,077		10		2	12	0
7,222,089		17		1	18	0
7,222,096		4		5	9	0
7,222,103		9		1	10	0
7,225,138		10		0	10	0
7,225,145		7		18	25	0
7,225,161		20		13	33	0
7,225,165		1		0	1	1
7,228,281		28		1	29	0
7,228,290		5		2	7	2
7,231,353		13		6	19	0
7,231,363		14		2	16	2
7,231,370		5		1	6	0
7,231,374		6		2	8	7
7,233,908		4		4	8	2
7,233,915		21		5	26	1
7,233,927		8		1	9	0
7,236,937		22		2	24	0
7,236,948		10		1	11	0
7,240,018		18		12	30	1
7,240,026		1		1	2	0
7,240,036		44		1	45	3
7,243,074		35		5	40	3
7,243,080		14		2	16	0
7,246,068		19		16	35	0
7,246,078		9		2	11	0

3.9B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
7,246,089	7		1	8	0
7,249,026	24		1	25	1
7,249,037	24		132	156	1
7,249,047	20		11	31	1
7,249,060	48		35	83	0
7,249,072	9		8	17	0
7,249,075	5		5	10	0
7,249,082	7		3	10	0
7,249,090	6		13	19	0
7,249,102	17		16	33	0
7,249,113	29		0	29	0
7,251,607	15		7	22	1
7,251,620	20		13	33	1
7,254,547	7		1	8	0
7,254,560	12		1	13	0
7,257,542	151		25	176	0
7,257,553	23		65	88	0
7,260,542	6		0	6	0
7,260,554	28		2	30	2
7,263,500	12		1	13	0
7,266,508	2		18	20	2
7,266,520	10		2	12	0
7,266,530	60		7	67	0
7,269,565	6		3	9	0
7,269,578	9		8	17	0
7,272,568	18		1	19	0
7,275,038	369		188	557	2
7,277,864	11		4	15	0
7,280,974	2		3	5	0
7,283,971	23		2	25	3
7,286,995	8		0	8	0
7,287,007	4		14	18	0
7,289,965	4		13	17	1
7,292,988	6		1	7	0
7,295,988	13		2	15	1
7,296,000	14		7	21	0
7,299,193	10		8	18	0
7,299,206	101		33	134	4
7,299,211	9		1	10	0
7,302,405	12		3	15	0

3.10A General patents quality indicators (2008)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
7,472,427	23		8	31	0
7,471,472	8		0	8	0
7,470,467	24		0	24	0
7,469,463	14		0	14	0
7,468,457	4		1	5	0
7,467,451	23		0	23	0
7,466,443	12		2	14	0
7,465,437	247		41	288	1
7,464,434	9		0	9	0
7,463,426	12		0	12	0
7,462,419	14		9	23	0
7,461,416	17		0	17	0
7,460,411	4		0	4	0
7,459,400	25		1	26	0
7,458,396	12		0	12	0
7,457,391	8		0	8	0
7,456,388	33		0	33	0
7,455,378	33		0	33	0
7,454,371	36		1	37	0
7,453,361	11		3	14	0
7,452,355	15		0	15	0
7,451,352	343		122	465	1
7,450,347	13		0	13	0
7,449,342	27		6	33	0
7,448,336	8		0	8	0
7,447,316	4		2	6	0
7,446,308	11		2	13	0
7,445,303	5		0	5	0
7,444,293	12		16	28	0
7,443,286	24		0	24	0
7,442,283	8		0	8	0
7,441,279	15		1	16	0
7,440,276	13		0	13	0
7,439,273	2		0	2	0
7,438,268	14		0	14	0
7,437,265	5		1	6	0
7,436,260	9		1	10	0
7,435,250	465		42	507	0
7,434,247	6		0	6	0
7,433,244	17		0	17	0

3.10A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,432,235		6		0	6	0
7,431,228		12		0	12	0
7,430,220		6		2	8	0
7,429,212		15		0	15	0
7,428,206		7		0	7	0
7,427,194		12		1	13	0
7,426,189		9		0	9	0
7,425,175		5		4	9	0
7,424,168		39		1	40	0
7,423,159		20		13	33	0
7,422,206		11		1	12	1
7,421,198		11		1	12	0
7,420,191		9		2	11	0
7,419,184		13		0	13	0
7,418,178		16		1	17	0
7,417,174		3		0	3	0
7,416,168		22		0	22	0
7,415,158		4		0	4	0
7,414,144		8		3	11	0
7,413,140		28		0	28	0
7,412,133		13		1	14	0
7,411,126		53		5	58	0
7,410,122		28		1	29	0
7,409,117		25		7	32	0
7,408,108		75		51	126	0
7,407,103		94		9	103	0
7,406,096		23		1	24	0
7,405,093		12		2	14	0
7,404,086		5		0	5	0
7,403,077		8		0	8	0
7,402,065		5		0	5	1
7,401,059		59		32	91	2
7,400,052		39		6	45	2
7,399,045		2		0	2	1
7,398,039		15		2	17	0
7,397,035		2		0	2	0
7,396,030		3		1	4	0
7,395,024		33		0	33	0
7,394,017		11		0	11	0
7,393,012		6		0	6	0

3.10A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				(Prior Patent and Nonpatent References)		
7,392,006		5		0	5	0
7,391,000		4		2	6	0
7,389,991		5		1	6	0
7,388,982		9		2	11	0
7,387,979		21		0	21	0
7,386,973		18		0	18	0
7,385,967		14		51	65	0
7,384,959		3		5	8	0
7,383,952		52		0	52	1
7,382,947		4		0	4	0
7,381,944		95		23	118	1
7,380,938		2		4	6	0
7,379,934		4		0	4	0
7,378,927		148		1	149	0
7,377,919		65		8	73	0
7,376,912		35		0	35	1
7,375,903		16		0	16	0
7,374,896		47		104	151	0
7,373,890		10		0	10	0
7,372,881		2		1	3	0
7,313,829		35		0	35	0
7,318,668		11		3	14	0
7,321,677		4		2	6	0
7,327,651		7		3	10	0
7,331,676		8		1	9	0
7,334,693		5		0	5	0
7,336,699		5		0	5	0
7,340,726		1		6	7	1
7,343,754		15		0	15	0
7,345,763		2		0	2	0
7,351,796		4		167	171	0
7,358,843		6		0	6	1
7,363,863		13		0	13	0
7,365,877		4		5	9	1
7,367,892		10		0	10	0
7,371,928		8		3	11	0

3.10B Business method patents quality indicators (Year 2008)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent	
7,315,823	17	6	23	1	
7,315,832	52	16	68	1	
7,315,842	3	2	5	0	
7,318,036	23	4	27	0	
7,318,047	34	7	41	0	
7,319,965	40	10	50	0	
7,319,978	47	4	51	1	
7,319,991	10	4	14	0	
7,321,858	66	14	80	1	
7,321,865	9	32	41	1	
7,324,948	22	5	27	0	
7,324,961	11	1	12	0	
7,324,967	18	42	60	0	
7,328,164	17	3	20	0	
7,328,175	17	7	24	0	
7,328,185	5	2	7	0	
7,330,817	15	14	29	1	
7,330,829	70	28	98	0	
7,333,936	20	1	21	0	
7,333,950	1	1	2	1	
7,337,119	3	6	9	1	
7,337,129	1	4	5	0	
7,337,141	13	10	23	0	
7,337,152	9	3	12	0	
7,340,405	7	14	21	0	
7,340,419	389	231	620	0	
7,340,434	7	3	10	0	
7,343,293	10	6	16	0	
7,343,308	9	6	15	0	
7,343,321	31	5	36	0	
7,343,333	3	0	3	0	
7,343,347	22	2	24	0	
7,343,360	8	20	28	0	
7,346,518	22	9	31	0	
7,346,531	76	53	129	2	
7,346,547	4	1	5	0	
7,346,562	8	0	8	0	
7,349,854	10	6	16	0	
7,349,867	38	7	45	1	
7,349,875	26	9	35	0	

3.10B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations	
	(Prior References)	Patent	(Prior References)	Nonpatent		
				and Nonpatent References)		
7,353,178		10		3	13	0
7,353,190		10		4	14	0
7,353,203		6		217	223	0
7,356,477		65		15	80	0
7,356,497		5		2	7	0
7,356,516		115		3	118	1
7,359,862		10		1	11	0
7,359,879		7		5	12	0
7,363,234		48		12	60	0
7,363,251		5		1	6	0
7,363,266		38		6	44	1
7,366,674		18		2	20	0
7,366,689		12		4	16	0
7,366,750		8		1	9	1
7,369,999		7		3	10	0
7,370,014		154		60	214	0
7,373,303		19		2	21	0
7,373,320		14		17	31	0
7,376,569		3		6	9	1
7,376,580		26		8	34	0
7,376,594		3		1	4	0
7,376,606		18		1	19	3
7,376,619		10		4	14	0
7,376,631		13		11	24	0
7,379,881		13		9	22	0
7,379,897		30		4	34	0
7,379,908		15		38	53	0
7,383,190		13		3	16	0
7,383,201		6		2	8	0
7,383,215		18		2	20	0
7,383,232		13		2	15	0
7,386,460		21		10	31	0
7,386,474		7		5	12	0
7,386,492		47		63	110	0
7,386,503		11		3	14	0
7,386,517		75		65	140	2
7,389,238		78		23	101	0
7,389,249		4		3	7	0
7,389,261		15		4	19	0
7,392,196		20		1	21	0

3.10B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and	
				Nonpatent	
				References)	
7,392,211	0	5	5	1	
7,392,228	4	2	6	0	
7,395,212	5	3	8	0	
7,395,225	13	6	19	0	
7,395,238	88	49	137	0	
7,398,218	25	10	35	1	
7,398,235	8	5	13	0	
7,398,250	19	0	19	0	
7,401,025	25	60	85	0	
7,401,038	3	1	4	0	
7,401,055	24	1	25	0	
7,403,903	16	8	24	0	
7,403,919	21	3	24	0	
7,406,425	23	66	89	0	
7,406,440	7	3	10	0	
7,409,351	15	1	16	0	
7,409,363	12	3	15	0	
7,412,394	5	5	10	0	
7,412,408	28	4	32	0	
7,415,420	15	2	17	0	
7,415,435	26	4	30	0	
7,418,397	6	11	17	0	
7,418,414	14	15	29	0	
7,421,395	27	8	35	0	
7,421,413	4	2	6	0	
7,424,435	12	4	16	0	
7,424,454	7	5	12	0	
7,426,472	24	3	27	0	
7,426,488	2	12	14	0	
7,428,493	31	12	43	0	
7,428,509	5	4	9	0	
7,430,512	10	0	10	0	
7,430,530	7	3	10	0	
7,433,828	23	14	37	0	
7,433,829	507	134	641	0	
7,437,303	14	10	24	1	
7,437,319	10	0	10	0	
7,440,902	20	1	21	0	
7,440,920	9	9	18	0	
7,444,300	27	36	63	1	

3.11A General patents quality indicators (year 2009)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
7,591,022		17		10	27
7,590,068		12		1	13
7,589,065		9		11	20
7,588,062		12		0	12
7,587,055		3		1	4
7,586,051		10		0	10
7,585,046		7		0	7
7,584,043		6		0	6
7,583,036		14		0	14
7,582,032		7		1	8
7,581,027		190		73	263
7,580,020		18		0	18
7,579,014		1		2	3
7,578,010		53		1	54
7,577,001		10		0	10
7,575,993		40		0	40
7,574,983		15		0	15
7,573,978		3		7	10
7,572,973		57		1	58
7,571,962		25		0	25
7,570,959		10		0	10
7,569,953		19		0	19
7,567,940		153		21	174
7,566,936		24		2	26
7,565,931		40		0	40
7,564,926		10		5	15
7,563,921		5		2	7
7,562,914		8		0	8
7,561,909		35		2	37
7,560,902		25		0	25
7,559,898		1		0	1
7,558,893		1		1	2
7,557,887		21		0	21
7,556,880		4		0	4
7,555,870		34		0	34
7,554,867		3		1	4
7,553,864		4		2	6
7,552,859		2		1	3
7,551,851		9		2	11
7,550,848		17		11	28

3.11A (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
7,549,844		20		0	20
7,548,835		2		0	2
7,547,827		10		17	27
7,546,820		9		0	9
7,545,817		18		0	18
7,544,811		1		0	1
7,543,806		27		0	27
7,541,797		5		0	5
7,540,837		100		1	101
7,539,831		4		0	4
7,538,824		35		0	35
7,537,816		15		2	17
7,536,810		13		0	13
7,535,808		25		0	25
7,534,799		3		22	25
7,533,792		3		0	3
7,532,783		4		5	9
7,531,771		8		0	8
7,530,765		1		0	1
7,529,762		7		2	9
7,528,755		51		0	51
7,527,745		17		1	18
7,526,740		11		0	11
7,525,730		120		43	163
7,524,721		1		0	1
7,523,714		9		0	9
7,522,707		9		0	9
7,521,700		6		0	6
7,520,691		27		0	27
7,519,689		40		14	54
7,518,685		16		3	19
7,517,677		7		10	17
7,516,671		14		50	64
7,515,664		4		3	7
7,514,654		17		0	17
7,513,650		31		1	32
7,512,643		14		1	15
7,511,639		16		0	16
7,510,633		5		1	6
7,509,625		161		50	211

3.11B Business method patents quality indicators (Year 2009)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior Patent References)	Patent	(Prior Nonpatent References)	Nonpatent and (Prior Patent References)	
7,475,020	66		6	72	
7,478,050	18		9	27	
7,478,063	72		6	78	
7,480,621	14		9	23	
7,480,630	1		1	2	
7,483,838	8		7	15	
7,483,847	14		4	18	
7,483,857	16		2	18	
7,487,098	17		0	17	
7,487,111	43		10	53	
7,487,122	11		1	12	
7,490,047	19		18	37	
7,490,057	3		7	10	
7,490,068	7		2	9	
7,493,266	27		24	51	
7,493,279	21		2	23	
7,493,287	12		4	16	
7,493,288	452		24	476	
7,496,518	24		12	36	
7,496,529	21		4	25	
7,496,543	13		2	15	
7,499,864	155		42	197	
7,499,868	7		11	18	
7,499,877	15		0	15	
7,499,889	8		4	12	
7,502,748	12		7	19	
7,502,760	13		57	70	
7,505,917	2		0	2	
7,505,918	559		126	685	
7,505,933	11		1	12	
7,506,001	8		0	8	
7,509,262	14		3	17	
7,509,271	9		3	12	
7,509,281	24		31	55	
7,509,282	9		4	13	
7,512,542	10		33	43	
7,512,554	28		9	37	
7,516,080	22		4	26	
7,516,096	12		2	14	
7,519,541	11		0	11	

3.11B (Cont.)

(US) Patent No.	Backward Citations		Backward Citations		Forward Citations
	(Prior References)	Patent	(Prior References)	Nonpatent	
				and Nonpatent References)	
7,519,557		4		2	6
7,523,043		2		8	10
7,523,060		43		18	61
7,526,434		16		9	25
7,526,454		8		2	10
7,529,682		17		13	30
7,529,695		16		12	28
7,529,712		43		94	137
7,533,026		20		1	21
7,533,042		30		2	32
7,533,059		28		7	35
7,536,307		49		8	57
7,536,323		6		23	29
7,536,337		2		15	17
7,536,353		4		2	6
7,539,620		151		39	190
7,539,634		8		3	11
7,539,650		76		13	89
7,542,914		9		2	11
7,542,929		5		10	15
7,542,944		24		6	30
7,546,243		30		8	38
7,546,254		5		1	6
7,546,270		5		9	14
7,548,866		83		7	90
7,548,880		12		11	23
7,552,056		36		6	42
7,552,075		9		3	12
7,552,091		37		9	46
7,555,435		17		36	53
7,555,445		19		5	24
7,555,462		39		9	48
7,558,738		7		0	7
7,558,758		7		15	22
7,562,022		18		2	20
7,562,038		123		43	166
7,565,302		37		25	62
7,565,321		15		1	16
7,567,909		18		4	22
7,567,921		10		1	11

