Applying the principles of system dynamics as a lever for sustainable service quality –

The case of commercial vehicle dealerships in South Africa

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I dedicate this thesis to our four children, Bastian, Liam, Sophie and Niklas. I hope you never stop asking questions.

DECLARATION

I hereby declare that this thesis, submitted in partial fulfilment of the requirements of Edinburgh Napier University, for the degree of Doctor of Business Administration, represents my own work and has not been previously submitted to this or any other institution for any degree.

All verbatim quotes have been marked within the text. All sources have been acknowledged and are included in the list of references.

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ABSTRACT

Service quality (SQ) has been a key driver of profitability in commercial vehicle dealerships and is bound to remain so in the increasingly dynamic and competitive context of the automotive sector. Current approaches to optimising SQ in this highly complex environment are mostly unsustainable in spite of an abundance of strategic initiatives.

System dynamics (SD), a modelling and simulation methodology, could prove valuable in exploring the dynamically complex SQ process and in facilitating effective solutions. However, academics and practitioners alike have paid little attention to research on how SD can help implement solutions to sustainably improve SQ – a loophole in both the literature and industry. The context of commercial vehicle dealerships is a critical case in point and elicits the following research questions:

- What is the nature of the SQ process in commercial vehicle dealerships?
- What are the systemic challenges impacting on the SQ process?
- How can SD be deployed to improve the SQ process sustainably?

To address these questions, this study develops a hitherto insufficiently established connection between the two streams of literature on SQ and SD and derives a conceptual framework for primary research illuminating key issues and concerns emerging from the application of SD to SQ. A pragmatic approach is adopted to examine through the SD lens the sociotechnical system that supports the dynamic SQ process in South African commercial vehicle dealerships.

The results show high degrees of interdependence between seven service system components, which underpin the SQ process in commercial vehicle dealerships and drive its change over time – stressing the need for system-based approaches to understand and optimise SQ. The central systemic challenge for service organisations is to make balanced and continuous investments – on individual, organisational and support structural levels – in the maintenance and development of static and dynamic service capabilities despite the daily operational pressure. Based on these findings, the study presents an operational framework consisting of four cyclical stages – Problem articulation & diagnosis,

Solution design and action planning, Institutionalisation, and Evaluation. The framework comprises a set of practical recommendations for service managers to effectively apply SD modelling and simulation to SQ for a sustainable SQ process in commercial vehicle dealerships in South Africa.

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LIST OF ABBREVIATIONS

CRM	Customer Relationship Management
CS/D	Customer Satisfaction / Dissatisfaction
DC	Dynamic Capability
DSC	Dynamic Service Capabilities
DSIT	Design-oriented Systematic Inventive Thinking
I	Interviewee
PSS	Product Service Systems
QFD	Quality Function Deployment
SD	System Dynamic
SQ	Service Quality
SQG	Service Quality Gap
SSC	Static Service Capabilities
SV	Service Value
TRIZ	Theory of Inventive Problem Solving
UST	Unified Services Theory

CHAPTER ONE INTRODUCTION

1.1. Introduction

The purpose of this research is to develop a practical framework to optimise and sustain service quality (SQ) in commercial vehicle dealerships in South Africa via the application of the key principles of systems dynamics (SD). SD is a modelling and simulation approach that enriches the understanding of complex systems by exploring the interrelationships between the key contextual variables at play within them. Simulations help comprehend how changes to elements and interactions of service systems affect SQ sustainably (Oliva & Sterman, 2010). In the context of this thesis, sustainability is defined as the ability to provide SQ in the long term, which implies the organisational capability to meet present and future customer demand.

Service delivery accounts for around 20 percent of the total revenue of an automotive manufacturer – primarily via repair and maintenance services and spare parts supply – and yields significantly higher margins than vehicle sales. Such a profitable business segment naturally attracts new entrants with different market offerings to address this market valued globally at approximately USD 800 bn (Breitschwerdt *et al.*, 2017). This development follows from *servitisation*, which is understood as the transformation "from a product-centric business model and logic to a service-centric approach" (Kowalkowski *et al.*, 2017, p. 7). The process occurs in phases from basic service provision to improved and extended service portfolios to the provision of integrated Product-Service-Systems (PSSs). PSSs integrate products and services to make the use of a product more efficient while improving its customer value (Beuren *et al.*, 2013).

Digitalisation is another IT-enabled, complementary initiative that can potentially transform automotive services. Amongst others, digital services like predictive maintenance as well as remote diagnostics, repair and reconfiguration (Winkler *et al.*, 2017) are increasingly integrated into standard service bundles offered by automotive dealerships (Book *et al.*, 2012). Historic and real time data about the technical state of the vehicle but also about the driving behaviour of the user fuels

this development and is seen as having a significant impact on service process complexity and resource efficiency (Lerch & Gotsch, 2015).

The manufacturing sector in general (Lightfoot *et al.*, 2009) and the automotive industry in particular (Verstrepen *et al.*, 1999) are greatly affected by this trend. Accordingly, automakers strive to professionalise the design and delivery of services to meet growing customer expectations (Fraser *et al.*, 2013), which – in the context of the commercial vehicle sector – concentrate on vehicle uptime maximisation (Bouvard *et al.*, 2011). The quality of services is therefore a key determinant of success of a company operating within this sector.

This longitudinal, action-oriented study explores the SQ process in commercial vehicle dealerships involving a mix of 25 urban and countryside service operations representing the retail network of a European manufacturer in South Africa. These organisations employ approximately 400 staff members in technical functions, such as technicians and foremen, and in commercial functions, such as service advisors and spare parts sales executives on different managerial levels. The study is based on an 18-months SQ process improvement project that the researcher led as part of his expatriate assignment in South Africa. 13 SQ executives who are employed by the South African wholesale organisation as well as the European manufacturer headquarters overseeing SQ process design and support have been consulted in relation to facilitators and inhibitors of sustainable SQ. A key informant validated the findings of the study.

First, this chapter discusses why SQ is generally difficult to achieve. It then develops an argument based on a discussion of the theoretical concepts of SQ and SD that only systematic efforts to improve SQ have lasting effects. Further, it provides an overview of the practical context to which SQ and SD are applied, commercial vehicle dealerships in South Africa.

The next section highlights the research problem, which points to why service managers insufficiently understand the complexity of SQ and therefore inadequately address it. The chapter then outlines the research aim, to develop a practical framework that helps service managers sustainably improve SQ in South African commercial vehicle dealerships. Lastly, it discusses the contribution this study makes on theoretical, empirical and practical levels.

1.2. The challenge of delivering sustainable service quality

Delivering SQ sustainably is not without its challenges. Very often, companies are unable to continuously provide services exactly as their customers expect. When faced with the problem of momentary mismatch between service demand and supply, organisations often resort to 'cutting corners and working overtime' to satisfy a customer in the short term. However, this course of action is not sustainable ~~in the longer term~~ (Oliva & Sterman, 2001) and it is not too astonishing that programmes launched to improve SQ are rarely successful (*e.g.*, Kaplan & Norton, 2004; Sterman, 2001). In their empirical study on organisational change, Sackmann *et al.* (2009) discuss the complexity of sustaining change in the long run. A meta-study on reported failure rate estimates over the past three decades suggests an improving trend from ~70% down to ~40%, but acknowledges that the task of implementation remains a very demanding one (Cândido & Santos, 2015).

Even though evidence-based research points to the concrete benefits of quality initiatives in relation to service, it seems hard to get management to move beyond paying lip-service and to commit fully to such initiatives (Antony *et al.*, 2007; O'Neill *et al.*, 2016). The chasm between management rhetoric and action with regard to SQ initiatives seems to stem from a lack of understanding of their importance as a key differentiator of business success (Beer, 2003).

However, this is perhaps not too surprising as SQ initiatives involve the capacity to deal with complex systems, to anticipate long-term consequences of actions, and to handle unpredictable contextual variables (Atwater & Pittman, 2006). All firms are complex systems formed to attain some desired ends through distinct organisational functions and interactions amongst them (Simon, 2001). SQ is a problem that is largely obscured (Krishnan *et al.*, 2000), messy (Forrester, 1992; Vennix, 1999), poorly structured (Smith, 1988) and embedded in a web of other related issues (Eden, 2004; Rodriguez-Ulloa & Paucar-Caceres, 2005). In fact, SQ is shaped by an ecosystem of multiple physical, social and individual factors interacting with one another (Meynhardt *et al.*, 2016), so-called 'sociotechnical systems' (De Florio *et al.*, 2013). Technical factors refer to products, e.g. vehicles

and infrastructure, e.g. a workshop, without which service delivery would not be possible. Social components relate to organisations of people that work together towards a common goal, e.g. a team of technicians repairing a vehicle. Individual elements have to do with personal behaviour, e.g. a receptionist greeting an incoming customer.

Managers are often tempted to ignore the complex nature of an SQ problem (Groesser & Jovy, 2016; Snowden & Boone, 2007) and opt for fast, simple solutions, so-called ‘quick fixes’. Symptom treatments attack the ‘tip-of-the-iceberg’ and actually improve SQ initially. In the long run, however, such approaches aggravate SQ as the fail to address the causes of a problem and consume ever more resources (Kim & Lannon, 1997; Repenning & Sterman, 2001). In fact, many managerial decisions about complex problems do not produce the expected results with the intensity, timeframe and space initially intended. In such situations, every decision produces two types of effects, *desired* and *undesired* ones. Desired effects are those that happen when, where and how the decision-maker expects. Any deviations from those expectations are undesired effects. The worrying issue with significant, undesired effects is that decision-makers rarely expected them (Sterman, 2000). This ignorance towards the possibility of events we do not expect to happen is deeply engrained in our thinking (Argyris, 1991; Brehmer, 1996).

Automakers are moving away from plain vehicle manufacture to the provision of more complex PSSs, which entail a combination of discrete yet interdependent activities. This calls for the transformation of managers into effective systems thinkers and reflective practitioners (Senge, 1992). In addition, managers who strive to deliver SQ need to view their responsibility as a complex systemic challenge. In consequence, service managers need more effective tools to enhance their thinking capabilities based on a holistic understanding of the processes that they have to oversee (Aquilani *et al.*, 2017).

System dynamics (SD) is such a tool. In essence, SD is a modelling and simulation methodology that is of particular benefit when addressing problems in complex settings, which change over time (Repenning & Sterman, 2001; Sterman, 2001). It allows for the exploration and understanding of the structures and dynamics underpinning complex systems (Kim, 2000). There is an increasing

recognition that SD can enable managers to develop an in-depth understanding of the *actual* problems arising from process-based activities and generate potential solutions that can maximise their effectiveness and efficiency (Little, 1970, 2004). However, there is also the recognition that SD is rarely put to good use and that there is need for a more systematic understanding and application of SD if it is to yield its intended benefits (Rigby & Bilodeau, 2017).

Therefore, this study sets out to address this loophole by conducting an in-depth investigation into how SD can help service management teams within the specific context of commercial vehicle dealerships in South Africa as a lever for sustainable SQ.

1.3. Research context

This section begins with a brief discussion of the theoretical background to introduce the key theories, concepts and models relating to SQ and SD (which will be expounded in the literature review) before providing a detailed overview of the practical background in which this study is located – leading to an articulation of the research problem *in context*.

1.3.1. Theoretical background: Service quality and system dynamics

The effectiveness of SQ is an outcome of human perception. A customer compares how well a service encounter met his expectations (Cronin & Taylor, 1992). Expectations are the results of various sources of information that are available to customers prior to service delivery. Amongst others, these are *promises* made by a service provider and *previous service encounter experience*. In consequence, expectations relate to what *should ideally* happen and what *is likely* to happen. Both expectations and perceptions differ from one customer to another and may evolve with time (Boulding *et al.*, 1993). Drawing on the Unified Services Theory (UST), a service is defined as a “process, [in which] the customer provides significant inputs into the production process” (Sampson & Froehle, 2006, p. 331). Customers influence the process of service delivery with varying degrees of strength. The more specialised and customised services are,

the more a customer can influence the process as well as its final outputs (Kellogg & Nie, 1995).

Customers thus determine largely the level of SQ. Customer expectations may be rooted in how organisations market their services, but also how key stakeholders perceive of them. Customer perception of SQ is further influenced by the quality image a service provider portrays. SQ may be broken down into two broad categories, 'functional' and 'technical'. The functional side concentrates on the process. The technical side focuses on the result of the service delivery (Grönroos, 1984).

Service quality gaps (SQGs) explain the discrepancy between how a service should *ideally* be and how a customer *actually* perceives it. Improving SQ by addressing those gaps (Harvey, 1998) requires the enhancement of its design (Fliess & Kleinaltenkamp, 2004) and the adherence to its specifications throughout the SQ process (Antony *et al.*, 2007). However, a service provider might not be clear about what its customers expect, how to translate those expectations into service design and specifications, or how to ensure service conformity (Parasuraman *et al.*, 1985). A complex understanding of the functional and technical factors that determine SQ over time is a prerequisite for successful improvement efforts (Kannan & Tan, 2005). In order to deal with such dynamically complex problems holistically, service managers need to use powerful tools for thought and action.

SD is a modelling and simulation approach that enriches the understanding of complex systems by exploring key contextual variables and their relationships and to explain their structures and dynamic behaviour. The principles of SD are rooted in the three streams of systemic thinking: 'Synthesis', 'dynamics', and 'closed loops' (Atwater & Pittman, 2006). Synthetic thinking is concerned with the overall goal of a complex system, for instance a service organisation, in order to understand the way in which its parts *inter*act. Dynamic thinking deals with the behaviour of a system over time, instead of performance at a certain point in time. Performance is assumed to be primarily the result of what an organisation does and *not* what happens to it (Wernerfelt, 1984). The ability of an organisation to act depends on its level of capability, i.e. its resources. Resource levels are subject to change over time. In consequence, resource-building and depletion

depend on existing resource levels (Warren, 2005). Closed-loop thinking assumes that every change to the status quo within a system triggers some form of *re*-action. A change improves or deteriorates the performance of the system as a whole, in the short-run or in the long-run (Fowler, 2003). Hence, decisions to modify elements or links in a system should be coordinated is such a way as to sustainably improve the effectiveness of the entire system as opposed to selected individual components (Simon, 2001).

SD is of particular value to SQ improvement in the context of commercial vehicle dealerships, an environment in which time pressure, number of transactions and complexity levels are extremely high. In such an environment, the risks of poor problem comprehension and superficial problem solving are especially elevated. SD can help service managers on two levels. First, SD makes the systemic nature of quality in automotive service operations transparent. SD models can show how the different pillars of a dealership operation and customer contributions depend on one another in the process of delivering SQ. As such, they create transparency around the service delivery system of a dealership which helps service managers to take appropriate action to optimise SQ sustainably. SD simulations can demonstrate how changes to the components and relationships of the service system affect SQ over time. They disclose the types of action that produce desired long-term effects, i.e. resource investment in service capabilities, and those that do not, i.e. resource investment in ad hoc problem solving.

Despite numerous SD studies in the service area, the researcher is not aware of any published SD-based project that clearly discusses how SD can be operationalized in the context of a commercial vehicle dealership organisation in order to produce SQ sustainably.

1.3.2. Practical background: South African commercial vehicle sector

The commercial vehicle sector forms part of the automotive industry, a major economic contributor globally. At its core, the sector embraces producers of trucks and buses, as well as their networks of suppliers and distributors. Commercial vehicle manufacturers depend on two groups of intermediaries on wholesale and retail levels to distribute products and provide services. A wholesale organisation is a representative of a manufacturer in a defined market,

typically a country. Its function rests on two pillars. The first pillar is concerned with the definition and implementation of standards, processes, and systems. The second pillar relates to operational service support for its retail network of wholly owned and private capital dealerships.

Apart from selling vehicles, which only applies to a small selection of organisations, the primary function of the majority of dealerships is to provide after-sales service to end-customers (Gaiardelli *et al.*, 2007). The latter are transport operators that carry goods and people locally, nationally, or internationally.

While there are significant differences among after-sales service providers in terms of ownership, revenue, number of staff, and facilities, the basic after-sales services they deliver is very similar. These services incorporate vehicle repair and maintenance as well as the supply of spare parts. A general manager oversees the entire service operation, consisting of two teams, a service team, and a spare parts team. The service manager runs a team comprising of service advisors, supervisors and technicians. A parts manager leads the spare parts team consisting of parts salespersons and warehouse operations staff.

In South Africa, the after-sales market for authorised dealerships, own-retail and private capital, is protected only for about the first four to five out of approximately ten years of the useful life of a vehicle (Braun, 2015). During this period contractual agreements between manufacturer and end user exclude independent market participants from performing major jobs on those vehicles. Non-authorised, independent service providers and parts suppliers are numerous in the South African market, however, and offer cheaper basic services and selected non-genuine spare parts. This market situation in conjunction with continuing economic stagnation creates an enormously competitive environment. Competing with independent players on the price front is futile due to significantly higher investments and operating costs authorised dealerships face in order to comply with infrastructural standards of a manufacturer. Providing superior quality of service to customers is fundamental to securing the after-sales service market share.

1.4. Problem identification

Delivering high quality service is a key success factor for any commercial vehicle dealership in South Africa. This is true in particular for manufacturer-approved service operators, which have to comply with a range of quality standards, processes and systems. Thus, addressing SQ issues is a multifaceted task. Service managers easily underestimate the complex nature of after-sales service delivery in this context and tend to oversimplify the SQ problem.

South Africa's business environment is exceptionally complex. The country battles with significant socio-political problems, such as high unemployment, severe crime rates, widespread corruption and poor governance (Littlewood & Holt, 2018). Such atmosphere fosters macro-economic uncertainty and scares off domestic and foreign investors (Redl, 2018). 'Skills shortage' and 'skills outflow' plague local businesses across all sectors and impede economic growth (Kaplan & Höppli, 2017).

In this highly challenging environment, commercial vehicle dealerships struggle to meet customers' needs. Risk and uncertainty transport companies face translate into sporadically changing service demands. These dynamics factor into the complexity of automotive service delivery, which makes SQ an even more difficult task (Snowden & Boone, 2007). Consequently, service managers work under immense stress, which impedes their ability to make sound decisions (Simonovic *et al.*, 2017), and "particularly to provide high-quality service" (Elmadağ & Ellinger, 2018, p. 122) in the long run. An ordinary reaction in such high stress environment is to rely on hunches, i.e. quick fixes that have previously worked. Since there is no time to reflect, service managers are prone to ignore that quick fixes are only temporary solutions with potential side effects that only unfold over time.

Ackoff (2006) argues organisations rarely make use of systems-based approaches for two general reasons: A common risk avoiding attitude by managers and a shortage of literature and training that speak to practitioners. More specifically, a third reason relates to the complex and taxing South African commercial vehicle sector in which service managers have to make things happen, now. Thus, the main research question guiding the study is:

How can the principles of system dynamics be applied to sustainably enhance service quality in commercial vehicle service dealerships within the context of the South African automotive industry?

1.5. Aim and objectives

The aim of the study is to develop a practical framework rooted in the principles of system dynamics to achieve sustainable service quality within the specific context of South African commercial vehicle dealerships.

The aim was broken down into the following objectives:

- To conduct a critical review of relevant streams of literature to establish an explicit link between the notions of service quality and system dynamics, leading to the development of a conceptual framework that informs the primary research.
- To gain an in-depth understanding of the nature of the current SQ process across a sample of commercial vehicle dealerships in South Africa.
- To examine the contextual factors impacting the SQ process using the key principles of SD as an investigative lens.
- To build, on the basis of the findings, an SD-enabled simulation model to optimise the SQ process within the chosen research context.
- To validate the simulation model in consultation with a key informant and to develop an operational framework to effectively translate it into practice as a means to achieving sustainable SQ.

1.6. Contribution of study at theoretical, empirical and practical levels

The study makes contributions at three levels. At a theoretical level, it leads to a deeper theoretical understanding of how the key principles of SD can be effectively applied to the SQ process to optimise and sustain it in the longer term. Also, the innovative design of this research gives guidance for other case-based, longitudinal field studies, which seek to combine different methods of data collection, analysis and validation

At empirical level, it provides rich insights into the sociotechnical service system underpinning the SQ process across a range of commercial vehicle dealerships in South Africa. The study casts light on how SQ process effectiveness behaves in response to change initiatives in service organisations of different sizes. It also provides a concise overview of factors impacting on SQ in this particular context, which are of relevance to other, similar service settings.

At practical level, it develops a simulation model based on SD principles, designed to optimise effectively SQ in the context of commercial vehicle dealerships. Further, it presents an operational framework, which demonstrates how the simulation model can be effectively translated into practice, giving due consideration to resource commitments, agentive roles and responsibilities, and intended outcomes.

1.7. Structure of thesis

Chapter 1 (current chapter) introduces the area of research: service quality (SQ) enhancement through system dynamics (SD). It outlines the theories of SQ and SD as well as the actual context of research: commercial vehicle service organisations. The research problem – how to effectively improve SQ – is articulated and is followed by the aim and objectives, which provide the framework of the research project. Finally, the chapter elaborates the contribution of the study.

Chapter 2 presents a critical review of relevant streams of literature on SQ and SD to synthesise current knowledge about these two distinctive fields of research and practice and to identify key theories, models and concepts leading to the development of a conceptual framework that will inform the empirical component of this study.

Chapter 3 presents a detailed account of the methodology developed in this study in order to achieve its aim and objectives outlined in Chapter 1. The overriding concern was to ensure an alignment between the chosen pragmatist philosophy and research methods and analytical techniques employed. This was achieved through a case-based, predominantly qualitative and action-oriented research

design, which combines a range of quantitative and qualitative of data collection and analytical techniques to allow for a longitudinal, complex and in-depth analysis of the main unit of analysis, i.e. the process of delivering service quality across a sample of vehicle dealerships in South Africa

Chapter 4 discusses via the SD lens – synthesis, closed-loops, dynamics – the SQ process within its context to identify patterns, emergent issues, and key findings. This analysis triangulates different sources of evidence from the three action-oriented, case-based data collection phases, which provide a credible account and useful insights into the research phenomenon.

Chapter 5 discusses the key findings from this research project and draws conclusions about their contributions to theory and practice leading to an assessment of their implications for further research. The overriding concerns were to ensure alignment between the research objectives and results in accordance with conventional quality criteria of rigour in qualitative research – generalisability, reliability and validity – as well as action stimulus to do justice to the pragmatic approach.

Chapter 6 presents recommendations for translating the SD-enabled simulation model into practice via an operational framework. These recommendations are in line with the key tenets of SD, which had been discussed throughout this thesis, and are informed by the change management literature in the context of sociotechnical systems.

The structure of this thesis is illustrated in Figure 1-1.

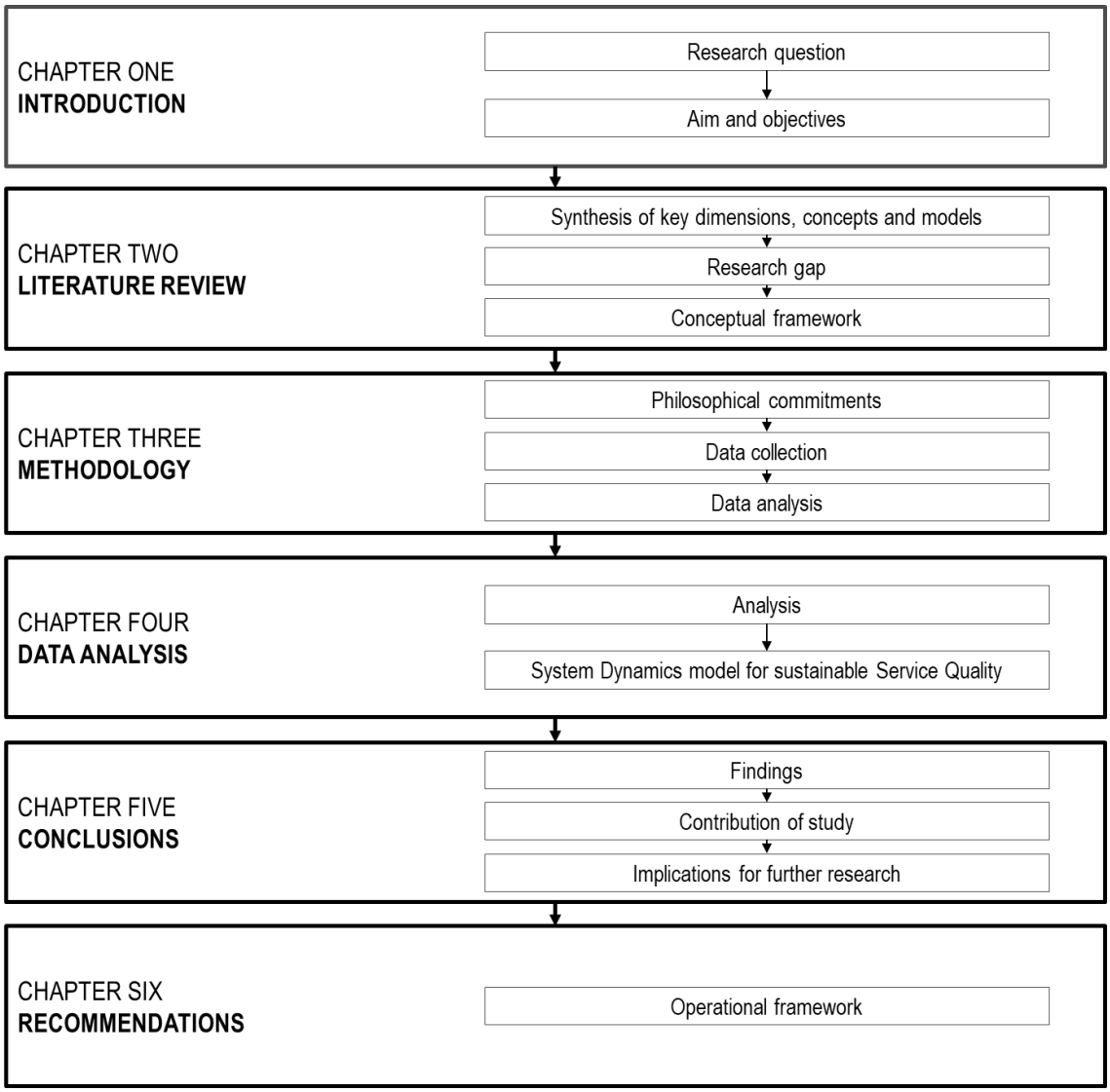


Figure 1-1: Structure of thesis

CHAPTER TWO LITERATURE REVIEW

2.1. Introduction

This chapter presents a critical review of relevant streams of literature on Service Quality (SQ) and System Dynamics (SD) to synthesise current knowledge about these two distinctive fields of research and practice and to identify key theories, models and concepts that will inform the empirical component of this study. The review selects literature based on three search criteria: *Relevance to the research question*, *significance* and *currency* of the works reviewed. It is organised into four sections. First, this chapter discusses the concept of SQ and its strategic relevance. It presents reasons as to why SQ is challenging to achieve and why organisational attempts to improve SQ sustainably often fail. Second, this chapter introduces the concept of SD as a useful approach to explore and sustainably improve complex situations across a range of business contexts. It sheds light on practical challenges of institutionalising SD practices in organisations in spite of their widely reported benefits. Third, it investigates potential benefits emerging from the application of SD to SQ. The resulting learning experience facilitates the development of unique dynamic capabilities (DCs) that are necessary to realise sustainable SQ improvements. Fourth, this chapter presents a conceptual framework that synthesises the key themes issues arising from the review and which will provide the theoretical foundations for the primary research.

2.2. Service quality

2.2.1. Service quality and its relevance for organisations

With the rise of services in advanced market economies since the 1960s the concept of quality extended from products to services (Prakasha & Mohanty, 2013). Twenty years later, Grönroos (1984) presented a *Service Quality Model*. According to this model, the level of SQ is a product of customer perception. Customers perceive the process as well as the outcome of services delivery. Perceived SQ follows from a comparison between *expected* and *perceived*

service. Parasuraman *et al.* (1985) developed a model based on *Service Quality* Gaps (SQGs). SQGs can be defined by three discrete states reflecting the relation between desired and perceived quality processes. There are three interconnected processes of quality production, experience, and evaluation that lead to customer satisfaction or dissatisfaction (CS/D) (Golder *et al.*, 2012). During the production process, the service operator transforms internal and customer resources into delivered services. The resulting quality level is a measure relative to design specifications. During the experience process, customers experience the entire service delivered, but they perceive only a fraction of it. The resulting quality level is a measure of the perceived benefit relative to customer expectation (Grönroos, 1984). During the quality evaluation process, customers transform experiences from individual service transactions over time into a comprehensive judgement. Since customers take an active role all three processes, they determine to some degree their own satisfaction and therefore SQ (Grönroos & Ojasalo, 2015). SQGs are of strategic concern as there are costs associated with poor SQ that are significant yet difficult to uncover (Krishnan et al., 2000). Most importantly, SQ affects the competitiveness of a company (Candido & Morris, 2000).

The value of quality service

Bolton and Drew (1991) present a model that shows how customers assess the quality and value of a service. CS/D draws on the difference between expectations and perceptions. In line with the concept of SQG, CS/D determines SQ and, in consequence, the attitude towards repurchasing a service from a particular provider. Similar to Golder *et al.* (2012), a judgement by a customer is based on the perception of a particular experience as well as a general, relatively persistent evaluation. Service value (SV) is the benefit a service creates for a certain customer considering the costs the latter incurs to receive it. Consequently, SV differs from one customer to another. Customers tend to attach a higher value to services that are more difficult to substitute. Interestingly, there appears to be a positive relationship between SQ and SV. The study of several telephone service companies revealed, however, that value was generally more important to customers than quality and therefore more decisive for their general attitude towards a service. Against the background that value assessments are

very customer specific, the authors conclude, service firms should offer adaptable services to address different customer needs (Bolton & Drew, 1991).

Service quality dimensions

It is common for service providers to capture customer feedback through satisfaction surveys to measure SQ. Those questionnaires target customer touch points along the service delivery process. Parasuraman *et al.* (1985) developed a conceptual model called SERVQUAL to measure the quality of services on several ~~quality~~ dimensions. Customers rate a service on a scale from one (strong disagreement) to seven (strong agreement). The resulting score indicates if a service exceeded or fell short of a customer's expectations. The higher the resulting score, the higher is the perceived SQ.

The initial model consisting of ten interconnected dimensions was subsequently condensed into a five-dimension model (Parasuraman *et al.*, 1991). These dimensions are 'tangibles', 'reliability', 'responsiveness', 'assurance', 'empathy'. *Tangibles* refer to a service provider's facilities and equipment but also to the appearance of its staff. *Reliability* is the capacity to deliver a service in a dependable and correct way. *Responsiveness* stands for the will and the promptness of service provision. The ability to gain customers' trust and confidence through service competency is referred to as *assurance*. *Empathy* is defined as the caring attitude of service personnel towards customers (Panda & Das, 2014). Each dimension consists of four to five items, which survey customer expectations and perceptions using sets of closed-ended questions.

Customer expectations are diverse and adapt with time since neither service contexts nor customer sentiments are fixed (Hsieh & Yuan, 2010). They determine customer satisfaction – and therefore SQ – yet are difficult to grasp. Expectations have two levels, a *desired* and an *adequate* one. What should or could happen based on personal beliefs, promises and experience, influences desired levels. Adequate levels depend on a customer's reflection on his own contribution to the service delivery process, alternatives, but also the nature of the service problem and force majeure. An area of tolerance lies in between those levels (Boulding *et al.*, 1993).

Perceptions are ways to capture reality through sensory, cognitive and conative processes (Werner & Wapner, 1952). Senses enable humans to gather data while seeing, hearing, smelling, tasting, or touching. They change over time. Cognition determines how one converts data into information for immediate or mediate use (Sullivan, 2009). Conation represents people's will to behave in a certain way based on the information available. It is important to realise that perceiving does not just happen but is rather an active process of discovering one's surroundings. The perceiver needs to be aware of the perceptual experience he can access. Perceivers lacking awareness will have 'blind spots' in their experience (O'Regan & Noë, 2001).

A perceptual experience broadly falls into one of four types. The first type is concerned with properties that describe how something is, e.g. *black* or *white*, *exceptional* or *very poor*. The second type refers to time-*less* objects, e.g. *a truck.* The third type is an event, e.g. *a specific repair service*. The fourth type concerns facts about properties of an object that prompts action. For example, *'The repair service performed on my vehicle was exceptional. I will visit this dealership again.'* Perceptions are always context-dependent activities (Noë, 2006; Schiller, 2012). In a study on the quality of urban transport service Eboli and Mazzulla (2011) showed that deriving objective indicators, i.e. quantifiable service attributes, e.g. number of daily bus services, from subjective customer perception measures prove useful in better comprehending the drivers of SQ. Therefore, the combined use of subjective and objective measures seems to be an effective approach to understanding and improving SQ.

Over the past decades the general model was applied across multiple sectors and countries (Ladhari, 2009). But also a number of sector-specific models with particular dimensions were derived from SERVQUAL (Ladhari, 2008). Figure 2-1 illustrates the dimensions of perceived SQ and their application to different settings.

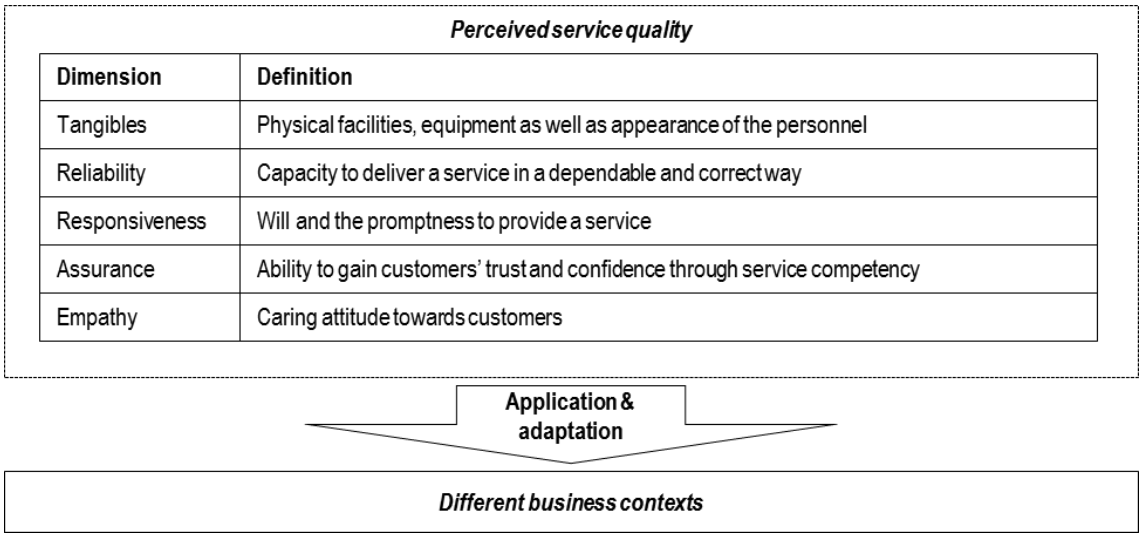


Figure 2-1: Perceived service quality dimensions

Recent research focuses on the complex relationship between 'customer experience' and 'customer commitment' to a brand (Keiningham *et al.*, 2017, p. 148). However, increasing numbers of stakeholders and customer touch points across multiple communication channels make SQ measurement quite difficult (Lemon & Verhoef, 2016). Keiningham *et al.* (2015) question the usefulness of absolute CS/D measures specific to an organisation and promote the use of relative measures that include competition. In short, SQ measurement along five quality dimensions is a controversially debated and complex concept that rests on two pillars, customer expectations and customer perceptions.

Service quality and profitability

There is little doubt that SQ should be of strategic concern to any organisation (Rommel *et al.*, 1994). There is superficial and partial evidence on the effects of SQ on profitability primarily because of the absence of longitudinal studies measuring the influence of SQ. However, SQ is associated with improved *revenue* through higher 'reputation', 'market share' and 'premium price' (Zeithaml, 2000, p. 74). Further it tends to lower *cost* in serving existing customers thanks to 'customer retention' and in attracting new customers through 'word-of-mouth' (*ibid.*). Customers satisfied with the quality of a service usually use this service again. Satisfied customers also incline to recommend the service of a particular firm to others. More service business means higher revenue and usually better profitability (Keiningham *et al.*, 2005). In their seminal work on the link between SQ and profitability, Heskett *et al.* (2008) present the succinct

service-profit chain model (Figure 2-2). According to this model, profit is a consequence of customer loyalty, which is product of customer satisfaction with a service. The latter is delivered by capable and productive employees, who themselves need to be satisfied to make a valuable contribution. Service organisations therefore need to ensure that they provide a work environment that addresses physical and non-physical service delivery requirements, i.e. a service delivery system that is conducive to attracting and keeping happy employees.

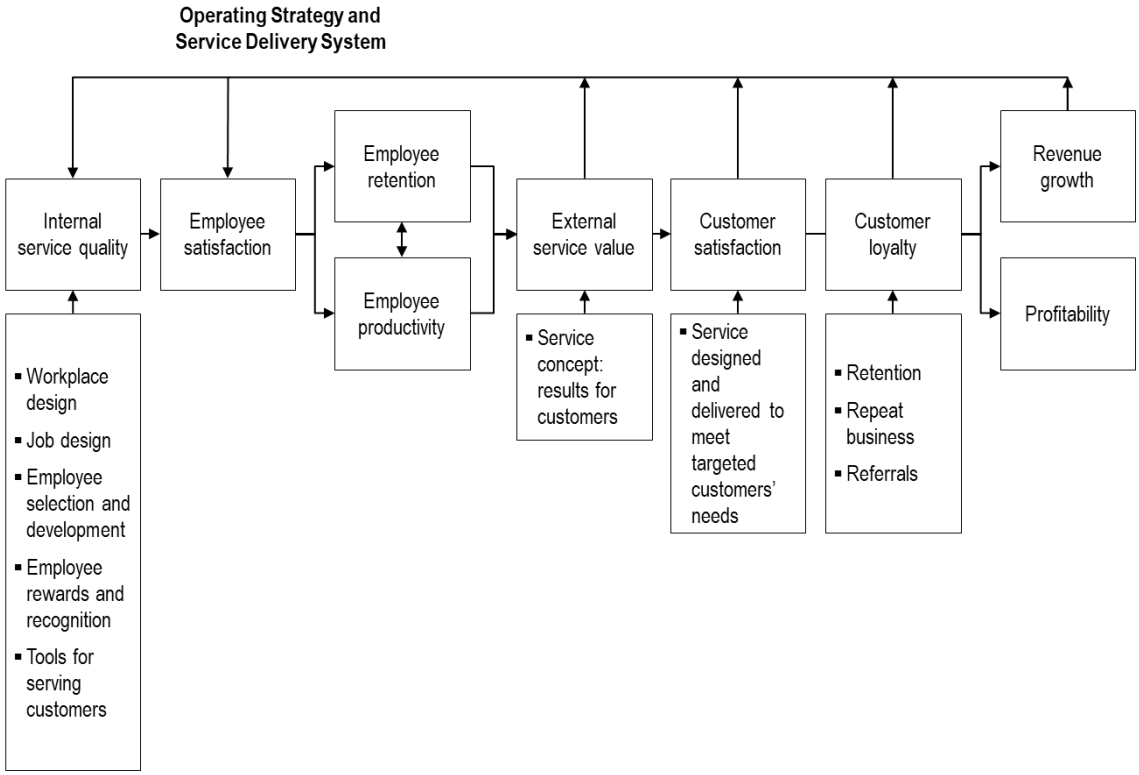


Figure 2-2: Links between service quality and profitability (Heskett *et al.* , 2008)

Both a service provider and its customers influence the effectiveness, efficiency and often the profitability of services. Services pose opportunities to defend existing markets and expand to new ones (Grönroos & Ojasalo, 2015). However, they carry significant risks, particularly to *servitized* firms, i.e. manufacturing companies that offer additional services. In a study of 129 bankrupt manufacturers Benedettini *et al.* (2015) found that the majority of companies had expanded their offering to services and had failed to successfully deal with customer demand. This study illustrates how SQ can affect the viability of firms.

2.2.2. The challenge of delivering sustainable service quality

Unfortunately, many attempts to improve the quality of services do not produce the expected results (Decker *et al.*, 2012). Implementation typically fails because organisations wittingly or unwittingly deploy solutions that do not fit their business contexts. The latter refer to internal assets and shortcoming but also to external risks and opportunities. These factors are unique to a firm and demand a tailored approach to quality improvement of services with varying degrees of complexity (Foster, 2006).

Services take the shape of collaborative processes and ‘complex sociotechnical systems’ (Pasmore *et al.*, 2019) where suppliers and customers interact. Diverse and volatile customer expectations and perceptions characterise these interactions. They can lead to erratic qualitative and quantitative shifts in demand. Unlike supplying finished goods, service organisations and their customers co-produce a service immediately as demand arises and do so largely in the public sphere. Schmenner (1986) defines service types along two dimensions: ‘[high/low] degree of interaction & customisation’ and ‘[high/low] degree of labour intensity’. Each of the four resulting service categories ‘service factory’, ‘service shop’, ‘mass service’ and ‘professional service’ pose different sets of challenges to managers. What is more, services are in flux, i.e. they evolve and move across categories.

Service firms typically combine a single service with other services. Therefore, it appears sensible to speak to *services*. Services as opposed to *non*-services are processes where a customer represents an important production factor. This may take the form of ‘customer-self input’ (e.g. taxi service), ‘customer’s belongings’ (e.g. car repair service) or ‘customer provided information’ (e.g. tax advisory service) (Sampson & Froehle, 2006). Service providers and their customers collaborate in all three phases of the service delivery process: input, transformation, and outcome. The input phase involves the provision of resources necessary to deliver services. During the transformation phase, service providers, customers, or a mixture of both co-create services. The output of the service-based production process correlates with the customer value these services create (Yalley & Singh, 2014).

The dynamically complex process of service delivery

The service delivery process rests on two pillars, resources, and interactions. A process is a “sequence of individual and collective events, actions, and activities unfolding over time in context” (Pettigrew, 1997, p. 338). Thinking in processual terms means assuming that reality is in flux, with the past affecting present and future. This is not to say that processes follow a pre-marked path. While there are indeed straightforward and rather rigid processes, there are also those that do not chart a linear trajectory and are in fact quite flexible. How a process advances depends primarily on the dynamics of its context.

Service delivery is a *complex* process because it consists of multiple, interrelated components. It is also a *dynamic* one (De Ruyter *et al.*, 1997) because there are multiple touchpoints along the journey where service providers and customers meet, each of which can potentially change the direction and speed of the further course (Lemon & Verhoef, 2016). In short, both market environments and contributions of customers as well as other stakeholders along the service supply chain can and often *do* change over time (Akkermans, 2018). In consequence, those in charge of managing service processes often meander and adapt as the need arises rather than follow a strict protocol.

Input – providing physical and non-physical resources

Both service operators and their customers provide physical and non-physical resources that are essential to the service production process (*see* Figure 2-3) Voss *et al.* (2008) argue that service providers make a number of strategic choices regarding ‘stageware’ (facilities, processes, etc.), ‘orgware’ (capability to execute and monitor strategies), ‘customerware’ (customer touch points along the service process), and ‘linkware’ (customer-service provider interfaces). Service organisations should have resource architectures that facilitate efficiently customer *input*, i.e. person, asset, or information (Sampson & Froehle, 2006), without compromising customer *satisfaction*. Efficient design supports customer input at the *time*, *place* and *manner* conducive to service delivery.

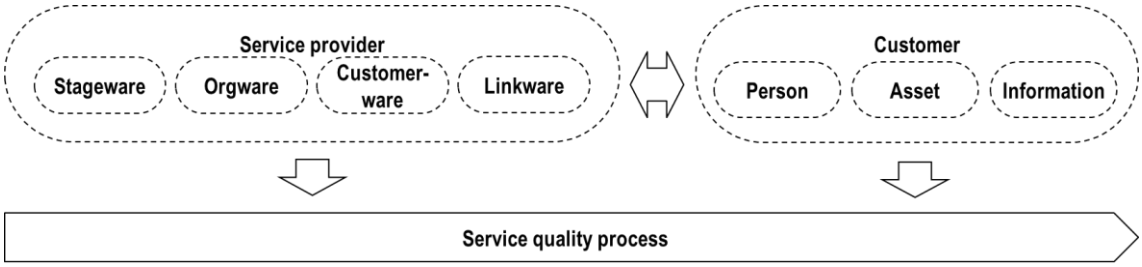


Figure 2-3: Service system accounting for the service quality process

A useful design method is called 'blueprinting', which refers to mapping the desired service process (Fliess & Kleinaltenkamp, 2004). Customers contribute to service processes in three dimensions: *physical*, *mental* and *emotional*. Physical activities involve perceiving, communicating and moving. Mental undertakings refer to managing information and processes but also to evaluation and decision-making. Emotional contribution reflects the state of customer attitudes towards the service process. Customers develop their emotions before, during and after the service encounter. Therefore, customer participation can be both a blessing and a curse (Fliess *et al.*, 2014). Keiningham *et al.* (2017) highlight the complexity surrounding customer involvement and recommend identifying and addressing those dimensions that are most important to customer commitment.

Transformation – different pathways to value creation

The combination of internal and external resources is at the heart of the transformation phase. Within this phase, customers are involved with varying degrees (Yalley & Singh, 2014). Here, the main challenge is to strike a balance between process efficiency and customer orientation. Carlborg and Kindström (2014) propose the application of modular strategies to service processes. Modularisation in this context means deconstructing a service process system into sub-processes. A sub-process is a sub-system, or *module*, which can function relatively independently. Through interfaces, a module is combinable with other modules to new, standardised services. As such, modular approaches enhance efficiency through uniformity and controls of processes while retaining degrees of flexibility. Bask *et al.* argue that modular services restrict customer choices and involvement in the production process, leading towards the 'productization of services' (2011, p. 309). The authors propose a framework to analyse services along the dimensions of *modularity* and *customization* (*see*

Figure 2-4). The depth of customer involvement is a measure of the degree of customisation [high/low]. The number of service options available to customers determine the degree of modularity [high/low]. The framework is applicable service offers, service production as well as production networks and can help managers assess and improve their strategic positioning.

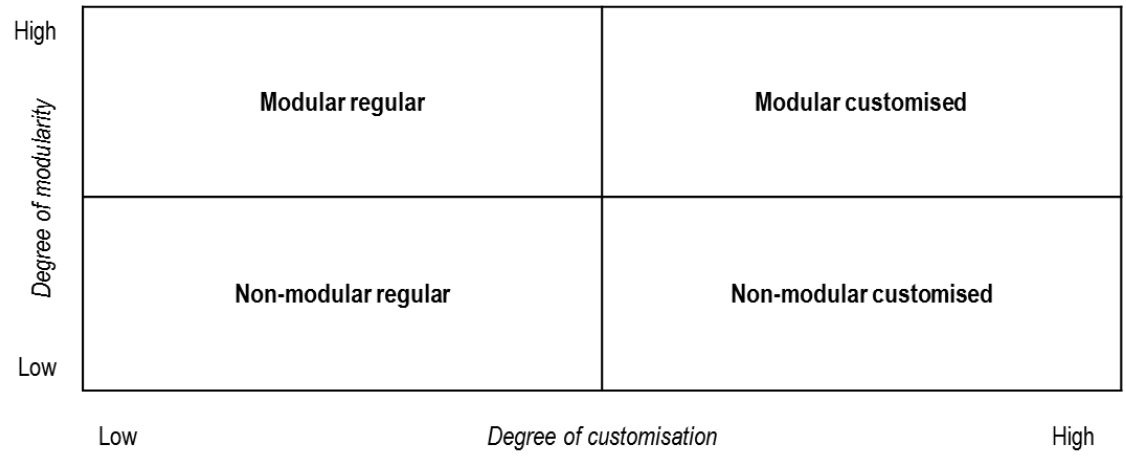


Figure 2-4: Framework combining service modularity and customization

However, modularity on its own does not necessarily lead to better performance. In a study of 231 service firms, Cheng and Shiu (2016) found out that 'service modularity capability' is the core driver of performance. Successful firms can *identify*, *configure* and *interface* components to create new services.

A way to classify services is to break them down into core, facilitating and supporting modules (Bolton & Drew, 1991). Core services represent the main offer to the market. Facilitating and supporting service modules exist to increase the efficiency and value of core services and as means for differentiation. The distinction between facilitating and supporting services is if they are required to use the core service or not. Customers have to make use of facilitating services but not of supporting ones (Grönroos *et al.*, 2000).

Output – value and quality

The output represents the overall success of the service process. Firms can evaluate the output in quantitative and qualitative terms but, in fact, the two are interrelated. Quantitative output refers to number of service processes completed, or revenue and profit generated within a certain period with the resources deployed. Value stream mapping is a simple technique used to visualise processes in order to identify and eliminate non-value adding, wasteful

activities from a customer's perspective (Andreadis *et al.*, 2017; Stadnicka & Ratnayake, 2017). However, there are natural limits to quantitative output maximisation because, in response to rising demand, service firms can prepare services they cannot inventory them. Dombrowski & Malorny (2017) show how service planning, a support process, can help reduce waste and grow customer value in after sales service. Qualitative output refers to the customer perceived quality of the service process and the value it created (Grönroos & Ojasalo, 2004). By no means is SQ an easy problem to solve because customer perceptions are subject to change. A shotgun approach to SQ enhancement is therefore unlikely to produce desirable results. Instead, service companies should carefully consider their strategies to improve the quality of the system that delivers services (Akter *et al.*, 2016).

Understanding service systems

A service system represents "a set of interacting entities that are involved in the delivery of one or more business services" (Banavar & Ramaswamy, 2008, p. 517). From the interdependent combination of resources from the provider and the beneficiary, a service system emerges. The goal of such a complex system is to create value for the service provider and the service beneficiary. In turn, the service provider receives a payment for a service that improves the capabilities of a beneficiary (Vargo *et al.*, 2008). Improving the long-term effectiveness of a system means to sustainably increase output while decreasing input.

In general, a system is collection of components that interact with one another. Complexity arises with increasing numbers of dissimilar, interrelated parts. Understanding complex systems is extremely challenging because they often do not behave as one might intuitively expect. Such comprehension requires a special set of skills (Hmelo-Silver & Azevedo, 2006) that are not very common (Ackoff, 2006). 'Classical science' theories adhere to analytic approaches, which essentially means taking something apart and putting it back together. The explanatory power of such approaches rests on the assumption that having a thorough understanding of fine-grained components and isolated cause-effect chains suffices to explain the whole (Bertalanffy, 1968). These approaches are perfectly suitable for *complicated* environments but not so for complex ones. Systems theory, on the contrary, accounts for problems that are systemic, or

complex, in nature. Complex problems are embedded in a web of relationships that are often nonlinear. Hence understanding the whole requires recognising the connections between the dots as well as their strengths and directions, while acknowledging that everything is in a constant state of flux. To contrast the two theoretic approaches, classical science favours the *isolated* and *static* view of reality while the systems view sees *interconnections* and *dynamics*.

How external factors affect service systems

Service-based production processes differ from manufacturing-based production processes in a significant way. Manufacturing-based production processes take place in a relatively *closed* system. Here, almost exclusively the manufacturing firm provides resources, plans the conversion of labour and material into products, and bases its yield on compliance with quality standards. Although customer interaction has grown due to the introduction of 'built-to-order' in the manufacturing environment strategies (Holweg & Pil, 2001), it is comparatively low. Service processes are performed in relatively *open* systems with high degrees of customer interaction and are therefore subjected to external influences (Grönroos & Ojasalo, 2015). The key difference between the between the two production processes can be summarised as follows: A manufacturer can stock finished goods in a warehouse as buffer for future demand, a service provider cannot. Services have to be produced as demand emerges and are therefore more difficult to plan capacities for (Oliva & Sterman, 2010).

The distinction between an *open* system (service delivery) and a *closed* system (manufacturing) perspective has implications for the understanding and management of SQ. Service systems are much more open because input from outside the organisation, i.e. customers as the primary suppliers, is a mandatory element of the production process. As already stated above, services can be categorised by different degrees of customer contact. In high-contact services, customer input is a prominent component of the production process. Here, most activities take place in the public arena, i.e. a relatively open system. In low-contact services, on the contrary, the service production process is largely independent of customer input and can therefore run in the background, i.e. in a relatively closed system. Since customer input may vary in strength and scope, it makes service production processes less predictable than goods manufacturing

processes. In consequence, high-contact service processes are comparatively more complex and inefficient than low-contact service processes. The better customer and service provider inputs are integrated, the more effective is the interaction. Integration improves the chances for mutual learning and understanding but also for utilisation of each other's requirements and capabilities. Continued relationship conduces to more realistic customer expectations and more customer-driven service-delivery. This closer match between anticipations and experience improves SQ (Grönroos & Ojasalo, 2015). In conclusion, service managers need to be clear about the kind of service operation, i.e. the level and type of complexity they face in order to devise effective policies to improve SQ (Chase, 1978).

Managers failing to understand the systemic nature of service delivery are likely to be unsuccessful at improving SQ sustainably. As they fix a problem in one area of their business, they create a new one elsewhere. For centuries, a problem or a 'mess', i.e. 'system of problems' (Ackoff, 1981) have been approached with analytic methods with diminishing success (Atwater & Pittman, 2006). The lack of managerial success is rooted in the mess as well as in the inability to think synthetically, i.e. systemically about it. Systems thinking is necessary to fix complex problems effectively. Organisations should therefore ensure their managers possess the necessary thinking skills and tools (Skarz, 2010).

Orchestrating the components of service systems

The effectiveness of a system depends on the coordination of interrelated components. The higher the level of inherent standardisation of components, the lower is the cost of coordination. The more independent an organisation is from others and the tighter it is linked internally through a modular structure, the better are its chances of survival. For, the survival of a system depends on its ability to anticipate and adapt to changes in its environment (Miller & Friesen, 1983; Quinn, 1989) or ecosystem (Rajagopalan & Midgley, 2015). This is a key explanation for the dominance of complex organisations and systems with such features in our world. Systems with architectures that are *nearly decomposable* have a competitive advantage over those that do not due to lower coordination. Nearly decomposable activities can be broken down hierarchically into units, units into subunits and so on. The *hierarchical* dependencies of units and sub-units *within*

a component are much tighter than the *vertical* dependencies *among* components (Frenken *et al.*, 1999). A commonly used metaphor in this context is the “Russian nested doll, also known as ‘matryoshka doll’” with the distinction that one unit’s subunit may also be the subunits of another unit (De Florio *et al.*, 2013). In other words, organisations share certain resources and apply them to different contexts or for different purposes. Albeit effective orchestration of resources is not without its challenges.

Organisations trying to lift the coordination of components that depend on one another run the risk of improving a single component and creating a local optimum at the expense of deteriorating a complex system’s performance overall, yielding ‘unintended side effects’ (Sterman, 2001). If, on the contrary, activities are independent from one another, an improvement of one activity improves the performance of a complicated system as a whole (Kauffman, 1990). However, Keiningham *et al.* (2015) argue that the overall effectiveness of a service system depends not only on the interaction between a single firm and its customer, but also how that single firm performs in comparison to its competitors. Similarly, Wagner *et al.* (2018) identify different, networked relationships between automotive aftermarket players illustrated several system archetypes. Not only customers and wholesalers, but also suppliers and competitors form part of a larger aftermarket ‘ecosystem’, a platform for service production and consumption.

2.2.3. Strategies to improve service quality

William Edwards Deming, the renowned quality management thinker and statistician argues that quality improvements have to be rooted in systemic understanding and follow a continuous cycle of planning, doing, studying, and acting, also known as the ‘Shewhart Cycle for Learning and Improvement’ (Deming, 2018). Figure 2-5 illustrates the well-known framework.

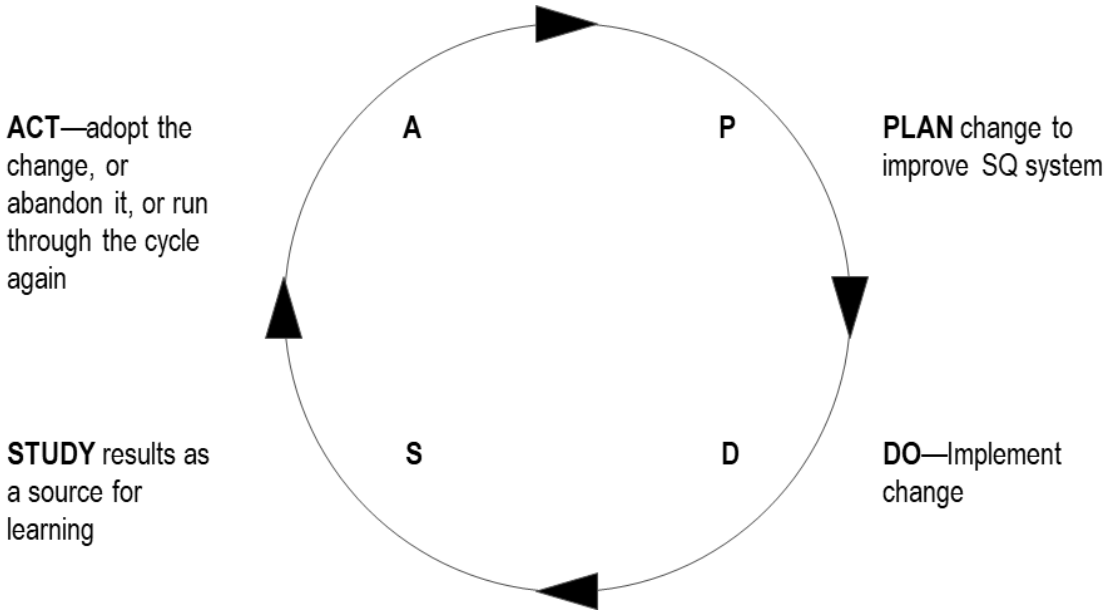


Figure 2-5: PDSA Cycle – framework for SQ improvement (Deming, 2018)

Frequent failures of quality initiatives mentioned earlier illustrate how rare systems thinking is and, in consequence, how common is firefighting. In response, Zhang *et al.* (2014) developed framework to assist practitioners in their quality improvement efforts. It rests on the two pillars of 'exploitation' and 'exploration'. Exploitation refers to improving the reliability and control of current services. It is characterised by gradual changes within existing strategic focus. Exploitation primarily relies on analysis, or 'convergent' thinking. Convergent thinking is concerned with identifying the optimal solution to a clearly demarcated problem space (Cropley, 2006). Arguably, in simple contexts leadership characterised by clear instructions and monitoring mechanisms work well (Snowden & Boone, 2007). Exploration relates to service innovation, which aims at shifting a firm's strategic orientation. Exploration is associated with synthesis, or 'divergent' thinking (Corazza & Agnoli, 2015). Divergent thinking refers to the process of generating a multitude of potential solutions to a particular problem based on available information (Gilhooly *et al.*, 2007). Divergent thinking, the process of breeding ideas is often confused with innovation. Innovation requires both idea generation and evaluation and is therefore based on two thinking style (Runco, 2008). Whenever the question of balance between exploitation and exploration arises, systemic leadership is in demand.

The introduction of Lean principles and practices to service organisations is an example of an exploitation strategy. Lean is a methodology that strives to eliminate wasteful activities in order to improve process efficiency, customer

focus as well as employee satisfaction (Smith *et al.*, 2018). Originally developed and adopted in the Japanese automotive manufacturing sector in the 1980s, Lean has also found its way into various service fields (Chiarini, 2013). The Lean toolbox ranges from visual management methods and previously mentioned process mapping techniques to statistical process controls (Antony *et al.*, 2007). Hensley and Dobie (2005) claim that organisations have to be ready for SQ improvements, i.e. they need to understand their processes and to have implementation experience. Further, they are advised to introduce Lean programmes as 'sociotechnical systems' (Smith *et al.*, 2018, p. 281). Focussing on employee motivation (social dimension) and customer value (technical dimension) arguably improves operational and financial performance (Hadid *et al.*, 2016).

Many explorative strategies follow a design-driven approach to address innovation problems. Savransky (1999) classifies problems by their potential cause [known/unknown] and by their solution search [known/unknown]. The number of possible problem variations as well as the number of possible ways to solve a problem, he maintains, explain the difficulty of an innovation problem. A clearly defined problem solvable in many ways is relatively easy. Conversely, an ill-defined problem with only a single solution is comparatively difficult. A phased process to address innovation problems is common and consists of "problem definition, problem resolution phase as well as solution evaluation" (Wang *et al.*, 2017a, p. 331). Depending on the difficulty of the problem, different approaches are in use along the three phases.

Bellini *et al.* (2017) view design and blueprinting as suitable approaches to overcome complex barriers to SQ measure implementation. Blueprinting is a method for the graphical illustration of service systems. Blueprints include perspective and structures of customer and service providers as well as their lines of interaction (Fliess & Kleinaltenkamp, 2004). Wang *et al.* (2017b) promote the use of blueprints in combination with the Theory of Inventive Problem Solving (TRIZ) and the Quality Function Deployment (QFD) to develop services. The authors present this approach in a framework on Design-oriented Systematic Inventive Thinking (DSIT). TRIZ is a methodology to derive general patterns from a specific problem, to generate a broad solution to the generalised problem, and lastly, to infer a specific solution from the general one (Kim & Yoon, 2012). QFD

is a method that helps translating the ‘what’ and ‘how’ of customer needs into concrete service design specifications (Park *et al.*, 2015).

However, innovations that stand the test of practice are usually the result rigorous evaluation, selection, adaptation and application (Watts *et al.*, 2017). For successful implementations, knowing *how* to exploit and explore is not enough. Organisations also need understand to *balance* their SQ improvement approaches (Rahmandad *et al.*, 2009). In face of emerging transactional and strategic challenges, organisations increasingly rely on IT systems. Managers cannot do without them to master dynamically complex service systems, which are neither intuitive (Akkermans, 2018) nor do they lie within human cognitive processing abilities (Choo, 2007). In fact, Sweeney & Sterman (2000) argue that individuals highly trained in maths and sciences fail to understand even the most elementary concepts of familiar complex systems and resort to inapt heuristics instead.

Zhang *et al.* (2014) point out that in ‘stable’ business contexts, organisations perform better when focusing on exploitation. In ‘dynamic’ contexts, organisation should invest in exploration. The more turbulent and the less predictable business environments get, the more susceptible are managers to universal remedy. The latter promises simple solutions that can allegedly fix all kinds of problems. What panaceas do instead is misleading managers to focus on what intuitively seems to be the right thing to do, i.e. to eliminate a problem when and where it occurs. In consequence, they omit to concentrate on the ‘right things’ (Ackoff, 2001, p. 59). The right thing to do is to seek to understand the nature of a problem, to ask *why* a problem occurred, and, as already stated above, to address it systemically.

2.3. System dynamics

2.3.1. Some theoretical considerations in system dynamics

SD is a methodology that facilitates learning about dynamically complex systems and devising effective strategies through phases of modelling and simulation. Founded in the late 1950s by Jay Wright Forrester, the SD approach is a ‘structural theory’ of a system that deals with the arrangement of elements in a

system and their causal relationships (Größler *et al.*, 2008). A well-known structural theory is systems theory (Fowler, 2003; Repenning & Sterman, 2001; Sterman, 2001). Systems theory accounts for problems that are systemic, i.e. embedded in a web of relationships that are often nonlinear. Hence understanding the whole requires recognising the connections between its elements as well as their strengths and directions, while acknowledging that everything is in a constant state of flux (Bertalanffy, 1968). SD models are 'content theories' that seek to represent the core building blocks and relationships inherent to real systems and to describe them in terms of their quantitative and qualitative characteristics (Größler *et al.*, 2008).

Theoretical consideration 1: System dynamics approach

The SD approach resides within the systems thinking paradigm. At its core, systems thinking embraces the idea of system specific 'emergent properties' (Checkland, 2012; Houghton, 2008) that evolve over time. Atwater and Pittman (2006) succinctly sum up the three main dimensions of systems thinking. 'Synthesis' reveals the purpose of a system and its parts in order to understand current behaviour. 'Closed loops' show directions and strength of interaction among system components. 'Dynamics' gives insight into the behaviour of a system over time.

Synthetic thinking seeks to comprehend the purpose of a system in its context. In other words, it tries to find out *why* a system exists. Once this is clear, the synthetic thinker studies *why* its elements behave the way they do. In contrast, analysis is concerned with understanding *how* the parts work, and from this knowledge, deriving *how* the system works. Analytic thinking treats systems mechanically, synthetic thinking biologically. While the former concentrates on the parts of a system, the latter on its interactions (Atwater *et al.*, 2008). Synthetic thinking assumes that the components of a system behave thoughtfully but not perfectly rational (Simon, 1979). From this follows that the behaviour of a complex system is neither completely random nor entirely predictable but follows patterns (Miller & Page, 2007).

Causes, i.e. behaviour of the parts of a system, and their effects, i.e. behaviour of the entire system, cannot be perfectly controlled or predicted. Parts of a system

respond to stimuli from other parts of the system and its context. This realisation is a profound departure from linear thinking whereby an effect is clearly attributable to one or more specific causes. Synthesis brings together opposing concepts that parts in a system relate to one another, but in a *non*linear way (Houghton, 2008).

In the absence of clearly traceable links between causes and their effects, the behaviour of complex systems over time is challenging to comprehend and even more so to explain.

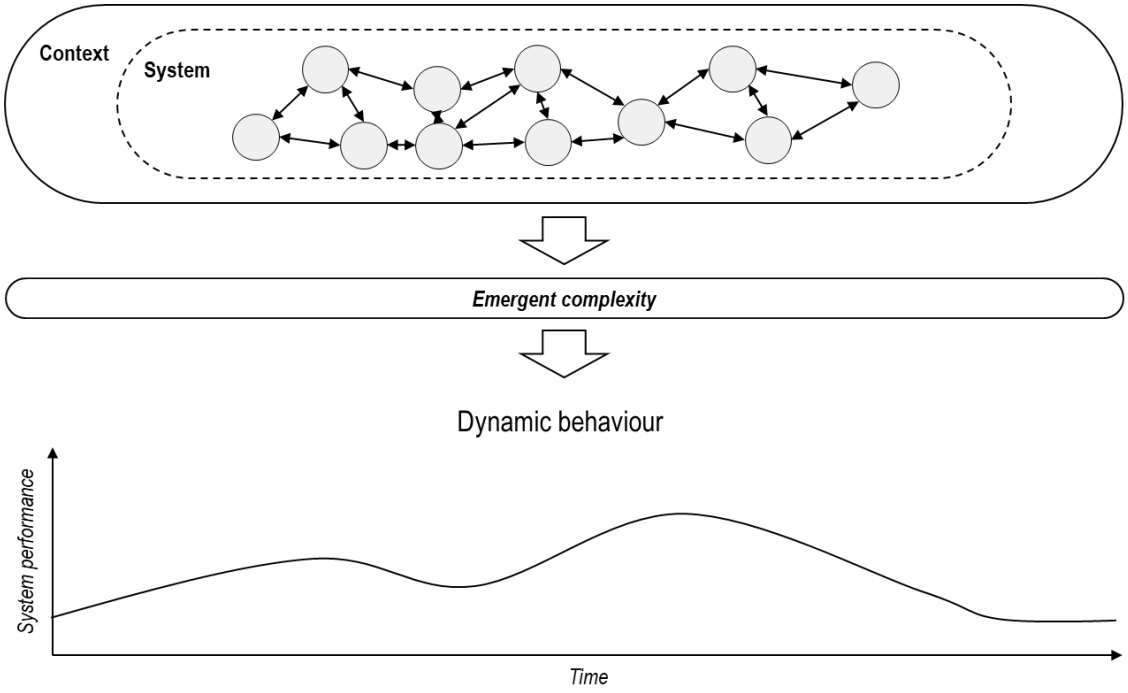


Figure 2-6: Complexity emerges from systemic interactions and leads to dynamic behaviour over time

Managerial work is largely concerned with making and communicating decisions about actions to improve organisational performance. Generally, decision-making routines pass through phases of problem recognition and diagnosis, solution search or design, and lastly, solution selection (Mintzberg *et al.*, 1976). As Quinn (1989) argues organisations do not meticulously plan and quantify these phases nor do they rely exclusively on the gut feeling of their leaders. Decisions rather emerge logically, resorting to planning while being sensitive to power-behavioural approaches. Decision-making in and about complex sociotechnical systems is necessarily incremental and requires iterations and experimentation, i.e. “tinkering at multiple levels of directness” (Reeves *et al.*, 2018, p. 23).

Congruent with common sense, goals drive actions and actions lead to results. As simple and convenient this line of argumentation sounds, it does not fit to complex systems. From the perspective of a system, everything is linked to everything else, immediately or allusively (Midgley, 2003). Action not only causes desired effects but also side effects. With a delay in time, both desired and undesired effects affect further actions and, indirectly, goals (Sterman, 2001). Hence, systems thinking adopts a closed loop perspective, which acknowledges that goals, actions and results are in causal, yet circular and indirect relationship.

'Closed loop thinking' recognises that complex systems feature three core elements: 'Feedback loops', 'delays', and 'nonlinearities'. The existence of *feedback loops* mandates the interdependence of inputs and outputs, thus – combined with delays – leading to complex behaviour of a system. There are two types of feedback: positive and negative. Positive feedback reinforces (R) the input effect, i.e. it has an additive influence. The arithmetic sign used in causal loop diagrams is a plus '+'. Negative feedback balances (B) the input effect, i.e. it has a subtractive influence, and it is marked with a minus '-' sign. It leads "towards some defined equilibrium conditions" (Fowler, 2003, p. 137). 'Delays' refer to delayed responses, i.e. they are not immediate. Delays, earmarked with the symbol '||', are common whenever humans are part of a system. Hannan and Freeman (1984) claim that organisations pay the penalty of structural delays – also known as 'inertia' – for consistent and liable performance. However, once organisations have overcome inertia and succeeded in realising a major change, they are likely to gain momentum and implement further changes (Kelly & Amburgey, 1991). 'Nonlinearity' refers to the dynamic behaviour a system and is the result of complex relationships between process input and output, direct but also indirect, random and disproportional.

'Dynamic thinking' is the process of seeing a problem in its temporal context, or "the mental application of the behaviour-over-time graph" (Maani & Maharaj, 2004, p. 23). Accordingly, today's problem reflects the current aggregate state of a system's continuous behavioural pattern (Richmond, 1993). Unlike other approaches, SD does not pay much attention to actions based on single agents inside a system and the isolated events they cause. Instead it focuses on a system's structural characteristics, which lead to universal patterns (Größler *et al.*, 2008). These have their roots in past behaviour and are the source of future

changes. Stiglitz *et al.* (2016) distinguish between three the dimensions of change: frequency, magnitude, and direction. When change is frequent but small and directional changes recurring, organisations perform best when they do *not* adapt their strategies. When, on the contrary, a major change happens in the environment, organisations should explore alternative strategies. Similarly, Taleb notes that “noise is what you are supposed to ignore, signal what you need to heed” (2012, p. 125). Hence, it is hardly surprising that recent decision-making research places more emphasis on managerial attention and cognition (Shepherd *et al.*, 2017). Simonovic *et al.* (2017) argue that reflective individuals make better decisions and learn more from them even in situations perceived as stressful.

In their exploration of the link between system thinking skills and performance Maani and Maharaj (2004) found out that effective performance depends on the ability to follow a recurring process of learning about a system’s structure, crafting apt solutions, and lastly decide upon action, considering their wanted and unwanted effects.

Theoretical consideration 2: System dynamics models

The purpose of SD models is two-fold: conceptualisation and simulation. Conceptualisation contributes to problem understanding by making links visible that are otherwise obscure. Simulation allows for the testing of solutions over time and within the context of a system (Zakery *et al.*, 2017).

A ‘conceptual model’ as an abstract description of a real system, Robinson (2008) argues, has to meet four qualities to be useful: ‘validity’, ‘credibility’, ‘utility’, and ‘feasibility’. In this context, validity is the structural accurateness appropriate for the purpose of the model assumed by the modeller. Further, Forrester (1968) points out that verification of the system description across multiple stages of the modelling process is an ‘agreement’ *on* as opposed to ‘proof’ *of* model validity is reached. Formal model validity pertains to the degree of confidence in *structure* and not in output accuracy as the purpose of modelling is to understand, explain and predict the real system’s *behaviour*. Validation therefore starts with empirical and theoretical tests concerning the key structural properties and parameters of the model. Credibility addresses validity from the client’s perspective. Utility refers

to the perception of the modeller and the client as to the translatability of the conceptual model into formal model and ultimately into a decision-support tool. Feasibility concerns the perceived time and cost involved in formal model development.

A ‘simulation model’ is a formalised version of a conceptual model. It serves as a tool for learning as it gives to its user insight into potential consequences of their decisions. It is a virtual laboratory allowing its user to obtain answers to important questions in cases where experimentation in a laboratory or in real life is “too slow, too costly, unethical, or just plain impossible” (Sterman, 2002, p. 525). It is a playground where asking ‘what if’ yields possible feedback that enriches the decision-maker’s learning about a system’s behaviour. Learning translates into “intuitive expertise [which] depends essentially on the quality and speed of feedback” (Kahneman, 2011, p. 241).

Harrison *et al.* (2007) argue that simulation is a third way of doing science. It shares common features with both deduction and induction but is also distinct from them. Simulation is like deduction, as its result is the direct consequence of assumptions made in the model about variables and decision rules. It is distinct from deduction because one cannot logically trace back simulation results to the model inputs. Simulation is like induction because the exploration of its output can lead to conclusion about causal links between the variables of the model. It is distinct from induction because neither observation nor experience form the basis of the output data. Instead, computer applications produce simulation results. Tolk (2013) stresses that simulation resembles a production system with input, rule-based transformation, and output. Yet, “no new knowledge can be produced by such computational efforts” (*ibid.*, p. 18).

Validity in the context of simulation concerns two areas. On the one hand, it refers to the link between the structure a simulation model has and the results it produces. ‘Structure-oriented behaviour’ tests subject the model to extreme conditions to observe the simulated behaviour. On the other hand, ‘behaviour pattern’ tests are carried out to validate the model’s capability to produce patterns (Barlas, 1996). In short, the quality of the simulation results highly depends on the model quality as well as the assumptions made.

2.3.2. Practicing system dynamics

The benefit of practicing SD is the “ability to manage the organization as a system” (Skarz, 2010, p. 60). Hence, organisations apply SD to generate systemic change. SD interventions classically take the shape of multiple project-based, group sessions moderated by an experienced modeller (*see* e.g. Luna-Reyes *et al.*, 2006; Rouwette *et al.*, 2000; Vennix, 1999). As previously mentioned, the SD process consists of two phases: modelling and simulation. During the modelling phase, the participants reach consensus on the problem at stake, conceptualise and formalise the system that exhibits problematic behaviour. The simulation phase comprises running virtual experiments under different policy conditions to test a system’s behaviour over time (Barlas, 1996). The main inputs to the SD process are the mental models of those involved in the modelling process. As defined by Doyle and Ford (1998) “a mental model of a dynamic system is a relatively enduring and accessible, but limited, internal conceptual representation of an external system whose structure maintains the perceived structure of that system” (*ibid.*, p. 17). The main output of the SD process is augmented mental models that reflect learning. The latter enables the development of crucial capabilities required for effective policy implementation. SD has found its application in a wide range of problems across different disciplines (Ramager & Shipp, 2009), including service operations (Größler *et al.*, 2008).

Practice phase 1: Modelling

Modelling leads to the development of systems thinking skills (Hung, 2008). As previously stated, the SD process is underpinned by conceptual models and simulation models.

Conceptual models represent visually the unique mental models of those participating in the modelling process. Mental models pertaining to a specific problem are representable as a map that includes variables as well as their causal relationships. Markóczy and Goldberg (1995) explain that these ingredients of causal maps have two different attributes. ‘Relevance’ is the first attribute and it is associate with variables or nodes in a map. The second attribute

concerns possible links between nodes describing them as having ‘positive or negative’ and ‘weak, medium, or strong’ influence.

In order to elicit causal maps directly from their source, process moderators make use of different techniques. Direct elicitation techniques broadly fall into two categories that differ by degree of structuredness. Hodgkinson *et al.* (2004) assessed ‘pairwise evaluation of causal relationships’ and a ‘freehand approach’ (*see* Figure 2-7). In the freehand approach, the moderator requests the participants to draw causal maps relatively freely. While limitations exist regarding modelling conventions for causal direction, polarity and strength of influence, participants can define variables and connections they are aware of and consider relevant. The ‘cognitive mechanisms’ at play with the two methods differ. Pairwise evaluation of causal relationships relies primarily on recognition, the freehand approach on recall. In pairwise evaluation of causal relationships, the moderator asks the participants to select relevant variable from a predefined list. Then, the selected variables are listed on the vertical and horizontal axes of a matrix. The participants now need to evaluate whether a relationship between variable exists. If so, they determine its causal direction, polarity (positive/+ or negative/-) and rate its strength (weak/1, moderate/2, strong/3). Lastly, the moderator transforms the resulting matrix of this robust, yet long-lasting judgement process into a detailed causal map.

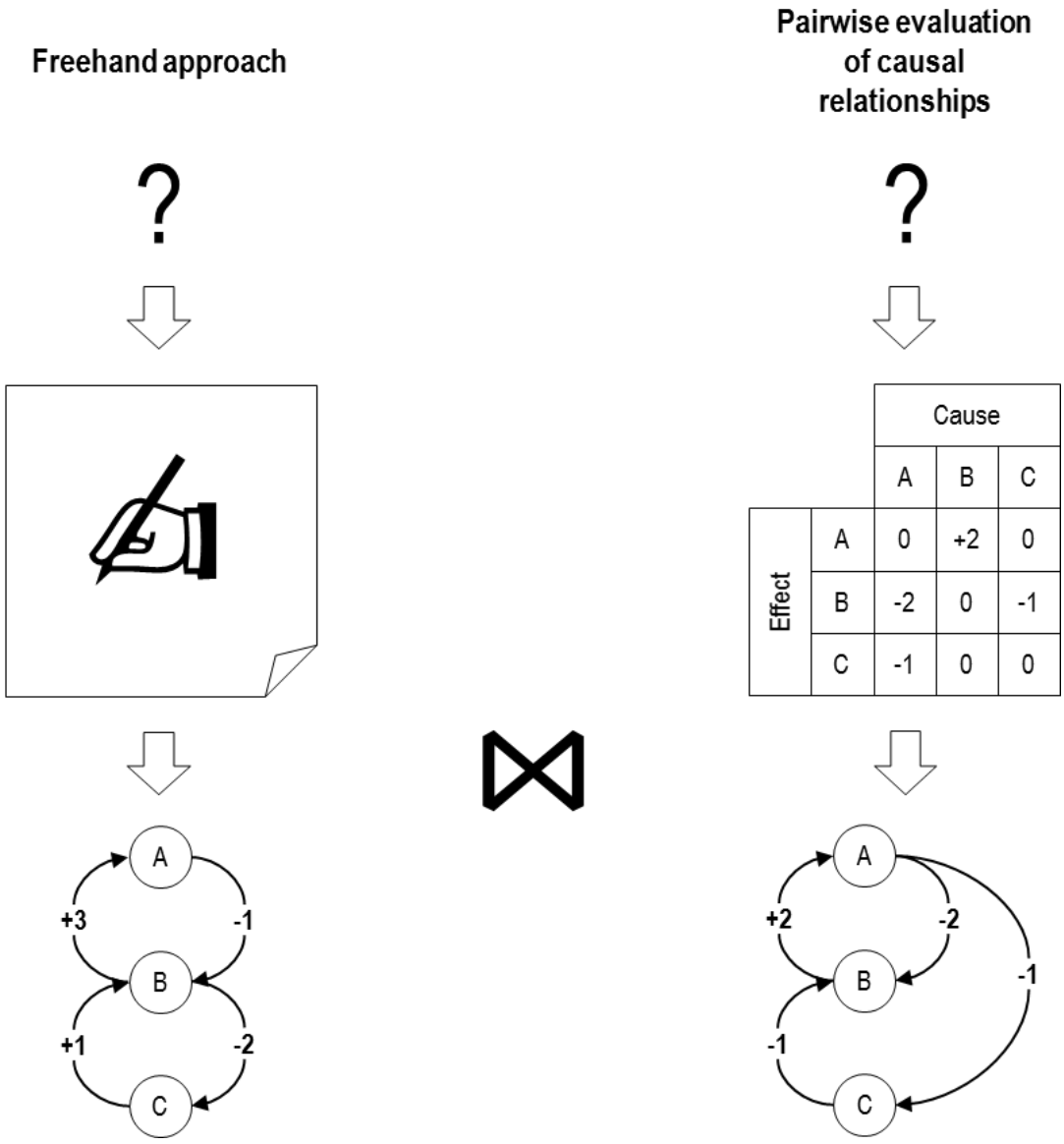


Figure 2-7: Conceptual modelling: Synthesising elicitation techniques

In either method, participants *can* and *do* make mistakes. In the pairwise evaluation methods, there is a relatively high risk of erroneously ascribing causal influences to variables. In the freehand approach, there is a relatively high risk of omitting to attribute causal influences to variables. Ross (1977) calls this phenomenon the 'fundamental attribution error' referring to the "general tendency to overestimate the importance of personal or dispositional factors relative to environment influences" (*ibid.*, p. 184). To address this 'problem of causality' (Warren, 2005), Eden (2004) recommends that researchers help their clients structure messy problems and therefore improve the quality of causal maps. Similarly, Crilly *et al.* (2006) argue that moderators can also use diagrams to stimulate input from participants that is otherwise demanding to extract. Against this background, it seems useful to synthesise different approaches, starting with

inductive, qualitative methods and continuing with a deductive, quantitative methods. The application of mixed methods to the modelling process certainly enhances model validity.

A useful way to facilitate the conceptualisation of models containing feedback loops and delays are system archetypes (Wolstenholme, 2003). They are illustrations of generic system structures that give insight into classes of problems and possible solutions (Kim & Lannon, 1997). Besides their use as educational tools, system archetypes are often the starting point for the conceptualisation and validation of specific system models during SD inventions.

'Shifting the burden' is an archetype that fits quite well the quality improvement challenge service systems face (Figure 2-8). Let us assume a service operator suffers from poor SQ, a situation that calls for (+) immediate action. The typical reaction is to introduce quick fixes, commonly labelled 'firefighting'. This measure mitigates the problem (-) instantly (B) but, at the same time, quick fixes consumes resources (-) required for the sustainable solution, namely the conservation and advancement of service capability. Although the effects of investment in service capability are delayed (||), they nevertheless improve SQ eventually and reduces the number of instances of firefighting (B). As a result, quick fixes only shift the burden to the future and deteriorate SQ in the end (R). The way out of this dilemma is the introduction of a 'solution link'. It stands for measures that balance the side effects of quick fixes, namely service capability erosion. In practice, these measures could be investments in the exploitation and exploration of routines and skills, either in place of or in addition to investments in firefighting. Albeit, sustainable solutions often lie outside a service system's boundaries, "in terms of disciplines, functions, accounting, power and culture" (Wolstenholme, 2003, p. 9). For this reason and because boundaries are subject to frequent change, organisations often ignore them and waste the opportunity for sustainable SQ improvement (Repenning & Sterman, 2001).

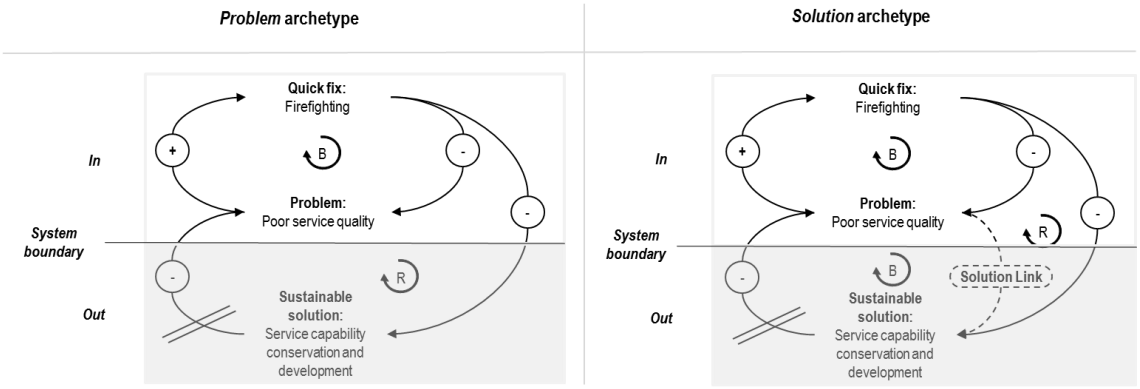
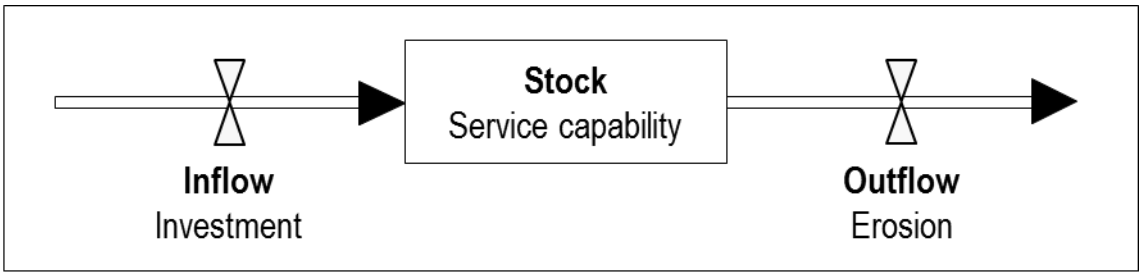


Figure 2-8: Conceptual modelling: System archetypes

Once the group of participants in the SD intervention have reached an agreement on the validity of the conceptual model, model formalisation can start. It rests on two legs, stock and flow diagrams and model equations.

In SD, stocks and flows represent the levels and rates of change and are depicted in diagrams (Kim, 2000). A stock is a resource, which – in the context of services – may be any physical or non-physical asset required in the process of service delivery, e.g. service capability. However, a stock may also be the product of a service process, e.g. SQ, revenue or profit. Absolute or relative units of measurement express stock levels. A resource level at a given point in time, i.e. a state, reflects its performance. Organisation have to invest in their stock because, over time, they erode or even become obsolete (Dierickx *et al.*, 1989). Flows explain how often (frequency), by how much (magnitude), and in what way (direction) performance changes (Warren, 2005). Frequency refers to the number of times per period a stock unit changes, e.g. once per month. Magnitude concerns the number or share of stock units at which a change occurs, e.g. five percent. Direction relates to inflow, which leads to a stock level increase, and to outflow, which contributes to its decrease.

Figure 2-9 illustrates the conversion from stock and flow diagrams to model equations. Integral functions represent stock levels (Oliva & Sterman, 2010). In our example, service capability (stock) defined as the number of service employees multiplied by the average number of training days. The service capability in period t_1 (stock level) is the initial stock level in t_0 added to the net flow of service capability from period t_0 to t_1. The net flow refers to incoming less outgoing service capability.



$$\text{Stock}_T = \int_{t_0}^{T} (Inflow - Outflow)dt + Stock t_0$$

=

Stock = INTEGRAL(Inflow – Outflow, Initial Stock)

Service capability =	(Investment – Erosion) + Initial Service capability
Investment =	(Number of service employees joining x Average number of training days per employee) / period
Erosion =	(Number of service employees leaving x Average number of training days per employee) / period

Figure 2-9: Simulation modelling: Stock and flow diagram and model formulas

Practice phase 2: Simulation

A formalised model is the starting point for simulations. The modeller transfers the formulas to a simulation software. The use of computers is essential because the multitude of calculations that have to be performed simultaneously (Harrison et al., 2007) exceed human processing capacities (Miller, 1956; Simon, 2001). Simulations provide a useful platform for learning and theorising, because “nothing is quite so practical as a good theory” (Van de Ven, 1989, p. 486). They give insight into a system’s behaviour under different model configurations.

In the ‘shifting the burden’ example, some firefighting is and will always be part a service system because of the nature of services discussed in previous sections. If firefighting takes over and is no longer the exception but the norm for extended periods, a service organisation enters a vicious cycle with staff burning out, service capability and SQ dropping and customers walking away (Akkermans, 2018). By the way, the inverse is also true. Organisations equipped with

exceptional service capability can move into a virtuous cycle in which competent and keen employees serving a happy and growing customer base. Figure 2-10 contrasts the effects the choices of investments in firefighting or service capability have on SQ. The former scenario leads to ‘better-before-worse’ SQ levels because a service provider spends more time on fixing problems symptomatically at the expense of eroding service capability. In the latter scenario, SQ levels display a ‘worse-before-better’ behaviour because the service operator concentrates on addressing the problem at its core, i.e. service capability, and takes into account short-term customer dissatisfaction (Repenning & Sterman, 2001). It goes without saying that investment choices are not about ‘either or’ but rather about varying degrees of ‘both and’. March (2006) advocates the adoption of a balanced and flexible approach, not least because the interconnectedness within and amongst systems leads to change that is not predictable in its entirety.

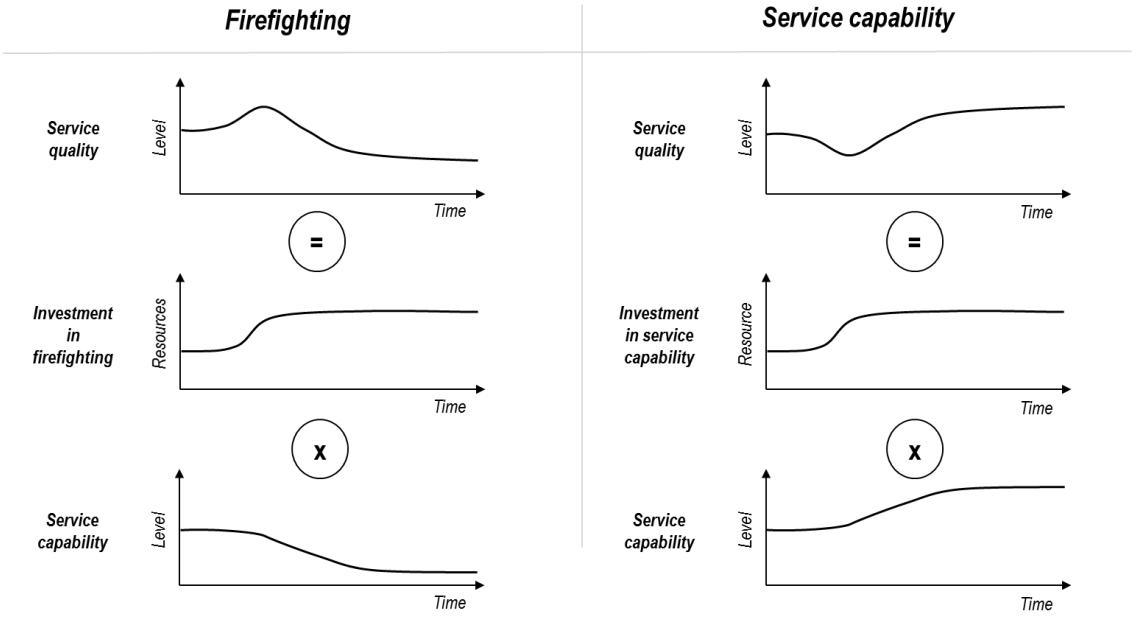


Figure 2-10: Simulations: Service system behaviour over time

Unlike the conviction of many managers, most stocks and flows lie within their sphere of influence and “almost nothing is exogenous” (Sterman, 2002, p. 505). Ackoff (2005) confirms that often managers have control or at least some influence over causes as well as well as their effects. The self-declared ‘presentologist’ concludes that they must worry more about the systemic problems of the *present* than of the projected and therefore uncertain future.

2.3.3. System dynamics implementation: Underrated benefits

Why should managers make use of system dynamics? The short answer to this question is found the title of a seminal article on the quality movement: “It’s the learning” (Senge, 1999). The more comprehensive version goes as follows: Managerial work is primarily about deciding over appropriate action based on incoming information about their organisation and markets, thus directing courses of change (Forrester, 1992). Managers often resort to models that help them make decisions (Little, 2004). A model of a system and its simulated behaviour over time is by default only a simple representation of the real system. No model can therefore be proven right in an absolute sense (Forrester, 1968) but it can nevertheless be useful to the processes of learning about and solving complex problems (Box, 1976).

SD considers that not all too often managerial decisions produce the expected results in terms of intensity, timing and space. Instead they trigger side-effects that had initially not been foreseen, let alone accounted for (Sterman, 2000). Numerous examples plausibly show that managerial decision-practice is primarily shaped by a linear cause-and-effect, ‘open-loop’ view of the world (Argyris, 1977). Such attitude ignores the possibility of unwanted feedback on a decision. It assumes that decision-making is straight-forward (Forrester, 1992) and – in the presence of perfect knowledge and information processing capability – a mere optimisation problem (Simon, 1979) that can be tackled with statistical techniques (Weaver, 1948).

SD on the contrary recognises that nobody hardly ever takes action in complete isolation from its context. There is usually some *re*-action emanating from an actor that forms part of the same system. The latter describes the ‘closed-loop’ view of the world (Sterman, 2001), which is adopted to better understand the behaviour of complex systems (Fowler, 2003). As previously stated, any action triggers some form of re-action that is balancing or reinforcing, indirect or immediate, and typically non-linear. SD resorts to modelling and simulation methods that help understand both the current state and the possible behaviour of dynamic service systems over time.

Despite of its usefulness, SD is criticised for a lack of formality in its validation process. Usefulness depends on how well a model addresses a specific purpose

or problem. Hence, questioning the validity of a model includes, in consequence, an inquiry into the purpose, which is a philosophical process itself. The objective of the validation process in SD is to progressively achieve validity of purpose-built models through a sequence of semi-formal tests (Barlas, 1996).

Why system dynamics interventions fail to make sustainable impact

Several scholars report about successful SD project across multiple sectors and problems contexts (*see e.g.* Gary *et al.*, 2008; Groesser & Jovy, 2016; Kunc, 2018). Also participants of SD interventions generally report quite positively about the project's impact (Scott *et al.*, 2016). Martinez-Moyano & Richardson (2013) distilled several best practices for SD interventions calling for more problem centricity, model simplicity, and client involvement along the process phases. Yet, despite its reported benefits to learning, understanding and eventually decision-making, few managers make use of SD beyond project-based interventions. Nobody disputes that suffering long-term pain in exchange for short-term gain is generally an unhealthy choice. Yet, managerial practice continues to do precisely that. Größler (2007) points out that most SD interventions fail to make sustainable impact since too little or no attention is placed on implementing organisational change, the last and probably most important step of the SD process. There are several reasons as to why SD interventions fail to make a sustainable impact.

Kim & Senge (1994) argue that practice does not change because deep learning does not take place. They have identified a few obstacles that prevent organisations from deep learning, which involves a shift of mental models, i.e. the way of thinking. The main hindrances are the inability to perceive the long-term consequences of decisions, the absence of common platforms and processes to reflect, and failure to pass individual learning on to others. Overcoming this problem requires changing the modus operandi of organisations. Often "we settle for fish rather than learning how to fish" (*ibid.*, p. 278), thus wasting the opportunity to develop skills that can bring about change. Further, Sterman (2002) laments that artificially erected barriers between disciplines inhibit the effective use of SD. The continuing process of specialisation leads managers to pigeonhole problems and to treat them ineffectively in isolation. Similarly Teece (2018) warns of risks emanating from a 'partial-system view'. Rumeser and Emsley (2016) claim that many SD projects fail because they focus too much on

modelling and simulation details at the expense of managerial involvement. Van de Ven (1989) succinctly adds that “impeccable micro logic is creating macro nonsense” (*ibid.*, p. 487). As a result, managers find it difficult to have faith in “technologies of rationality, i.e. frameworks, concepts, models, or methods” (Jarzabkowski & Kaplan, 2015, p. 538) that are unclear and therefore of questionable practical value. According to March (2006) technologies of rationality have thee building blocks. *Abstractions* of real systems include key components and causal relationships. *Data* accounts for organisational and contextual attributes. Lastly, *decision rules* inform that selection of strategic options. Without sufficient managerial involvement and understanding, the chances of institutionalising SD practices are meagre.

Best working practices

Martinez-Moyano & Richardson (2013) investigated the perceptions of 27 experienced SD practitioners about best practices for each phase of the SD process. The authors added a step to the standard process that is concerned with ‘learning strategy’, for the main purpose the modelling process, as argued above, is an enriched problem understanding. From the statements of their respondents, the authors distilled a set of rules that provides practical guidance. The most important rule elements are clarity of purpose and problem, methodological simplicity and consistency, and client involvement. In this regard, Black (2013) emphasises the potential of SD visualisations, e.g. causal loop diagrams, behaviour-over-time charts, etc. as boundary objects. These help crossing boundaries that exist in organisations because of differences amongst individuals in education, experience and motivations. Boundary objects are therefore a key lever of organisational communication, participation, and ultimately change.

In a review of organisational change literature, Al-Haddad and Kotnour (2015) call for alignment between change ‘types’ and ‘methods’ through ‘change enablers’. Scale [small/big] and duration [short/long] are the two core dimensions of *change types*. *Change methods* fall into the categories of ‘systematic change’ and ‘change management’. *Systematic change methods* refer to routines and techniques to implement selected strategic initiatives of exploration or exploitation. The purpose of *change management methods* is to frame and orchestrate different initiatives in alignment with the overall strategy of an

organisation. *Enablers* include expertise, resources and management commitment, all of which determine an organisation's readiness for and positively influence the outcome of change (Heckmann *et al.*, 2016). Based on Deming's work, Douglas & Douglas (2015) argue that the success of quality initiatives largely relies on organisational cultures, in which management styles follow a 'systems approach', which *accepts* human fallibility as opposed to the 'person approach', which *punished* human errors.

2.4. Applying system dynamics to sustainable service quality

SQ has been identified in the literature as a key competitive differentiator cutting across industries and markets. Universal trends of servitisation and digitalisation intensify its salience but also its complexity. Investigating SQ in the context of the automotive industry is particularly attractive, given its economic weight, complexity and need for change.

The South African market is of specific interest because the country is characterised by high levels of uncertainty that weigh heavily on the automotive and other key industries. To survive in such an environment, automotive firms need to be flexible and adapt to changing market conditions. Little research has so far been undertaken on SQ in commercial vehicle dealerships, a context exposed to greatly fluctuating customer demands, immense time, cost and competitive pressures. What is more, staff turnover is high and skilled employees are difficult to find. Providing sustainable SQ in such an environment make commercial vehicle dealerships an interesting case for investigation.

Just as other organisations in the service field, commercial vehicle dealerships engage in initiatives geared towards the qualitative improvement of their service systems. Unfortunately, such interventions rarely yield effective enhancements in the longer term as individuals and organisations largely continue to ignore dynamically complex relationships inherent to service systems. In consequence, ways neither of thinking nor of acting change substantially because learning from SQ programmes is rather shallow on the theoretical and practical fronts (Ackoff, 2006; Senge, 1999). The application of SD principles to SQ in this context can potentially improve this situation.

2.4.1. Enhanced dynamic capabilities

Service organisations continuously ask themselves *what* to do to improve SQ, *why* and *how*. They need to nurture "dynamic capabilities (DCs) of sensing, seizing and reconfiguring" (Fischer *et al.*, 2010, p. 618) to spot and grab service opportunities as well as to rearrange and develop selected resources to remain competitive. Winter (2003) argues that dynamic capabilities are 'high-level routines' that focus on strategic *change* of organisations which is necessary for their long-term competitiveness. The scholar contrasts *dynamic* capabilities with *static*, so-called "'how we earn a living now' capabilities" but also with 'ad hoc problem solving' (*ibid.*, p. 992). Static or ordinary capabilities are those that ensure the continuation of current business operations and are therefore essential to the survival of any firm (Teece, 2012). *Ad hoc problem solving* refers to ill-prepared responses to environmental changes. DCs on the contrary help to proactively and creatively explore and expand possibilities and to shape change at a strategic level, in particular in the service context (Saul & Gebauer, 2018).

Schilke *et al.* (2018) developed a framework that discusses and causally arranges the core building blocks of DCs: 'antecedents, dimensions, mechanisms, moderators, and outcomes'. *Antecedents* comprise several organisational, individual and environmental factors that help create and nurture DCs. *Dimensions* explain primarily analytic, functional, and procedural aspects of DCs, i.e. who applies DCs, why and how. *Mechanisms* relate to mediators that enable the conversion of DCs into desired results. *Moderators* are organisational and environmental factors that highlight contextual dependencies of DCs. *Outcomes* refer to performance enhancement and organisational change.

Organisations also have to make strategic choices as to the selection and development of DCs (Helfat, 2018). Pisano (2017) developed a framework that maps four basic strategic options resulting from two dimensions, 'general-purpose versus market-specific' capabilities and 'deepening versus broadening' capabilities. SQ improvement efforts fall into the category of general-purpose, deepening capabilities, which enable service firms to compete in new markets.

DCs rest on 'micro foundations' (Teece, 2007). These are a service operator's unique assets, which include essential 'organisational routines' and 'individual skills'. *Organisational routines* are systems, structures, and processes that

support the activities of sensing, seizing and reconfiguring. Feldman (2000) argues that organisational routines are “temporal structures used as a way of accomplishing organizational work […] with qualities of both stability and change” (*ibid.*, pp. 611-613). Change forms part of many routines because associates of an organisation often have some discretion over the way they perform routines. Through a reflective process they have the chance learn from their experience and, to some degree, make modifications to existing routines (Gray, 2007). *Individual skills* refer to entrepreneurial abilities of managers to review and transform assets continuously with the aim of benefiting from opportunities as well as of mitigating risk. These capabilities do not sit very well with traditional command-and-control leadership styles but also relate more closely to ‘systemic leadership’. *Systemic leadership* is about encouraging individual ‘autonomy, creativity and accountability’ and about nurturing ‘emergence and organizational renewal’ (Collier & Esteban, 2000, p. 213). Leadership should therefore be concerned with selecting, developing and combining those unique routines and skills that produce strategic advantage which is responsible for ‘sustained abnormal returns’ (Teece, 2012, p. 1395).

2.4.2. Improved service system

Teece (2018) argues that DCs are rooted in systems theory. He presents a model that integrates DCs three main components: Capabilities, resources, and strategy. *Capabilities* are processes to maintain, adapt, and transform an organisation’s way of doing business. Those processes are interdependent and organised into hierarchical structures. *Resources* are tangible and intangible assets organisation need to compete. Those assets may be universal, i.e. comparatively easy to obtain, or exclusive, i.e. difficult to get. A *strategy* provides a general direction that helps gain competitive advantage (Mintzberg, 1987). Strategies are adjusted to respond to or protect against environmental changes and to evolve over time (Quinn, 1989). Consequently, strategizing often happens in an experimental fashion (Reeves *et al.*, 2018) but follows a generic process of problem spotting and exploration, solution generation, selection and implementation (Mintzberg *et al.*, 1976). Systemic integration of the three components of DCs allows organisations to transform their resources to master

strategic change. Speed and intensity are parameters that determine the strength of DCs.

DCs are both a product as well as a factor of learning about *what* an organisation should do and *how* (Pisano, 2017). Learning is the process of acquiring knowledge through identifying and correcting errors of ‘commission’ and ‘omission’ (Ackoff, 2006). Useful knowledge is ‘actionable information’ (Rowley, 2007) about rules to address problems that are distinct, yet structurally similar across multiple domains. Existing knowledge is challenged by experience, which can lead to the formation of new knowledge through reasoning (Toulmin *et al.*, 1979). New knowledge is an addition to existing, established knowledge or created through its verification (Alvarez *et al.*, 2012). Despite wide-ranging agreement that managerial learning improves practice, top managers find it particularly difficult to learn (Argyris, 1977, 1991; Kolb, 1976) since learning starts with ‘self-doubt’ (Srikantia & Pasmore, 1996). Self-doubt and reflection are rather uncommon traits amongst executives. Even under highly uncertain circumstances they often follow blindly their intuition and simple heuristics – often with disastrous consequences (Kahneman, 2011). Particularly in dynamic contexts, questioning ones assumptions and experimenting with different choices is a powerful source of learning (Ackoff, 2006; Lei, Hitt, & Bettis, 1996; Rahmandad *et al.*, 2009; Snowden & Boone, 2007) that helps building DCs. DCs help improve SQ through mediators. Mediating mechanism are responsible for activating and calibrating strategies of exploitation and exploration. It is in this phase when organisations proactively change the configuration of their resources and devise other unique managerial interventions in response to emerging risks and opportunities affecting SQ.

From the previous discussion on SQ dimensions follows that DCs in the services context are deeply concerned with systemic challenges and opportunities. Dynamic service capability (DSC) is therefore to be understood as the systemic formation and calibrations of resources in search of enhanced service quality (Lai, 2004).

2.5. Conceptual framework

The conceptual framework of Figure 2-11 encapsulates the main concepts and their links, thus forming the basis of the primary research of this study. Concepts are answers to *what* aspects are relevant, links show *how* these aspects are related (Whetten, 1989). Three building blocks – *approach, application and evaluation* – frame the concepts of system dynamics, service quality, service systems and dynamics capabilities. Major links (L1, L2 and L3) represent the dominant relationships *between* the building blocks. Minor links denote associations *within* a block.

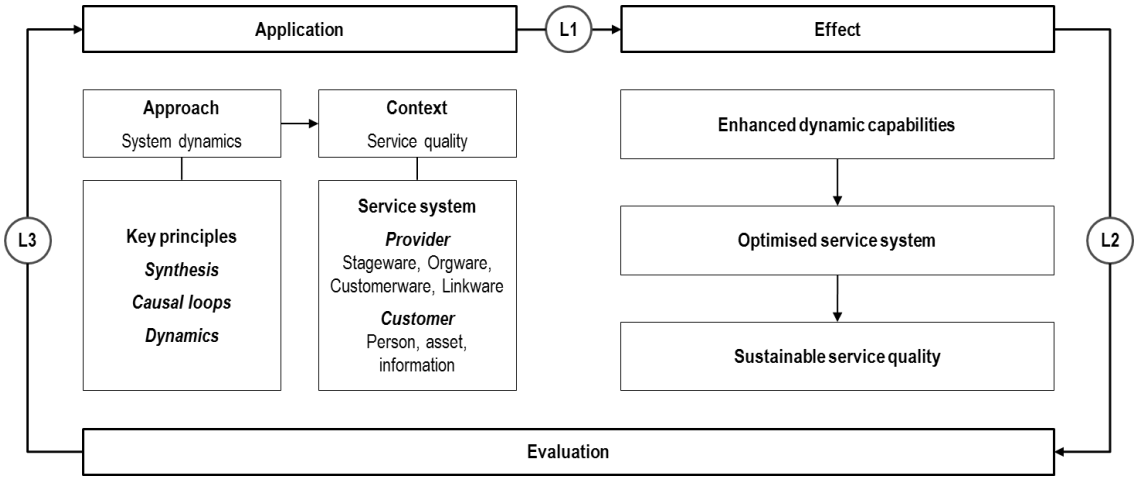


Figure 2-11: Conceptual framework

Approach: System dynamics

Most organisations operate in complex environments that are characterised by high levels of uncertainty. Extant literature has presented SD as a useful modelling and simulation approach to support the understanding of dynamically complex systems. This study contributes to knowledge about *what is important* for the operationalisation of SD. In the words of Checkland (2012), it addresses "engagements with complex reality" (*ibid.*, p. 469).

Link 1: Application to Effect

L1 represents the bridge between SD and its application to SQ. It explores *how* the key principles of SD unfold in the specific context of SQ.

Context: Service quality

SQ is of strategic relevance to organisations across sectors. The trend of servitisation underpins its importance. Unfortunately, most attempts lead to short-term success but fail to improve SQ sustainably. The core problem with improvement efforts is their relative ignorance towards the dynamic complexity that is inevitably part of service systems. Thus, this study seeks to identify *key drivers* of dynamically complex behaviour.

Link 2: Effect to Evaluation.

The ultimate purpose of managerial work is to make a positive impact on an organisation in a sustainable manner. The strength and robustness of executive efforts depends on how well organisations receive them. Little research is available about *how* to institutionalise the principles of SD after project-based interventions in a service organisation thus to deliver sustainable SQ.

Effect: Enhanced dynamic capabilities, optimised service system, sustainable service quality.

Organisations that develop DCs are more likely than others to cope with future challenges. DCs emerge from deep learning, which is a product of experiencing and making sense of mistakes. In the context of complex service systems where cause and effect are often unclear, learning is difficult. DCs rely on idiosyncratic micro foundations, i.e. organisational routines that encourage learning. Extant literature has shed some light on the effects of DC on different services, but – to the knowledge of the researcher – not yet from a SQ perspective. Service systems are changeable since they are dependent on customer interactions, which are often volatile. The positive influence of the SD process on group and individual level learning is widely reported. Being able to understand and act sensibly within dynamically complex systems helps improving SQ sustainably. Thus, this thesis seeks to find *key factors* that enhance the effectiveness of SQ improvements.

***Link 3: Evaluation to Application*.**

In line with the closed loop worldview of system thinkers, the conceptual framework includes a feedback loop that accounts for *ways to improve continuously* the SD approach to SQ following the evaluation of its effects.

This conceptual framework provides a synopsis of the theoretical grounding of this research which is necessary to “make meaningful sense of empirically-generated data” (Voss *et al.*, 2002, p. 198). Further, it heralds a discussion about the methodology of research adopted in this study. The conceptual framework directs the three data collection phases using observation, semi-structured interviews and workshops.

CHAPTER THREE METHODOLOGY

3.1. Introduction

The purpose of this chapter is to present a detailed account of the methodology developed in this study in order to achieve its aim and objectives outlined in chapter one, under section 1.5. The overriding concern was to ensure an alignment between the chosen pragmatist philosophy and research methods and analytical techniques employed, which is seen as a precondition for a credible and trustworthy account of the object of study (Arbnor & Bjerke, 2011).

This chapter comprises seven sections. The chapter begins with a discussion of pragmatism considering in some detail its ontological assumptions, epistemological objectives and axiological commitments. The chapter then moves on to discuss the methodological implications of pragmatism keeping in view the specificity of the context in which the study is conducted. First, it provides a brief explanation of the case-based, predominantly qualitative and action-oriented research design, which combines a range of quantitative and qualitative of data collection and analytical techniques to allow for a longitudinal, complex and in-depth analysis of the main unit of analysis – which, in this case, is the process of delivering service quality across a sample of commercial vehicle dealerships in South Africa (Yin, 2013). The chapter proceeds to discuss the specifics of the data collection methods, which tapped into multiple sources of evidence. The data collection was sequenced in discrete phases to allow for a progressive understanding of the overall nature of the process of SQ within the chosen research context and importantly, to examine, in consultation with key stakeholders, how it can be optimised via the key principles of SD. The data collection methods involved participant observation, an audit of the activities underpinning the SQ process, semi-structured interviews with key informants, and a confirmatory workshop designed to validate, from the perspective of the research participant, the key findings and the simulation model derived therefrom. In line with the case-based approach used here, a form of purposive sampling was used to access respondents for all phases of the research (Jankowicz, 2005).

The chapter moves on to explain the process of data analysis and the techniques employed to organise and triangulate the data collected, make sense of the different sources of evidence and draw substantiated conclusions (Jick, 1979). The next section discusses the core criteria employed – generalisability, reliability, and validity, action stimulus – to evaluate the finding of this research. A section on reflexivity deals with the key challenges arising from each of the three phases of research. These challenges were objectivity, engagement and usefulness. The chapter concludes with a discussion of ethical concerns and ways in which they were addressed in the study.

3.2. Research philosophy: Pragmatism

This study is grounded in pragmatism as a philosophy of science. Pragmatism is a teleological philosophy of science – which, in short, means that it provides the parameters for a type of scientific inquiry which is seen as a means to an end and is geared towards practical and valuable outcomes (Ormerod, 2006). As a philosophy of science is primarily concerned with questions of existence (what exists?), knowledge (how can we know what exists?) and values (what interests and commitments drive the quest for knowledge?) (Psillos, 2012). Pragmatism has its roots in North America of the late nineteenth century and was developed mainly by three philosophers – Peirce (1868), Dewey (1891, 1905, 1910) and James (1907) – who called into question the foundations of scientific inquiry at the time. They argued that the fundamental problem with the dominant mode of research was its reliance on pure logic leading to the production of facts, which fail to offer practical meaning and purpose for life.

As opposed to positivism, pragmatism is deeply concerned with the meaning and practical relevance of context-specific problems and their solutions. Usefulness is the key quality measure in pragmatic inquiry. It necessarily follows from a process of purposive selection and evaluation against hands-on benefits. Research involves iterations between the world of thought and the world of action thus making pragmatism a more credible and trustworthy philosophy both amongst theorists and practitioners (Whyte & Crease, 2010). Appositely, Ulrich

(2007) calls pragmatism a ‘philosophy for professionals’ whose value unfolds with practical application.

The expression ‘application’ implies the dynamic nature of knowledge. This truly pragmatic conception is a departure from traditional understanding of knowledge as being static and concerned with objectively observable facts. Pragmatism resonates with von Glasersfeld's (2001) ‘Radical constructivist view of science’ in which he calls into question the belief that knowledge is rigid and impartial. Instead, a constructive process creates and develops ‘viable’ knowledge that is conducive to the achievement of selected goals. The cognitive and developmental psychologist Piaget (1964) accentuates the emergent dimension of knowledge. He argues that “to know is to modify, to transform the object, and to understand the process of this transformation and as a consequence to understand the way the object is constructed” (*ibid.*, p. 176). This conception of knowledge reinforces the key tenets of pragmatism.

This transformation in conceiving reality as something fluid and producing valuable and applicable knowledge about it could be seen as a paradigmatic shift. A paradigm refers to a system of underpinning presuppositions regarding the nature of reality, the focus of research as well as the way it is undertaken. In the context of pragmatist research, it unites a group of professionals that base their research on such a foundation, whatever shape it may have and however explicit it may be. Paradigms are subject to change as they erode with the rise of scepticism about the principles of its scientific practice. New paradigms emerge through process of search and selection of “a new set of commitments, a new basis for the practice of science” (Kuhn, 1970, p. 6).

In the following discussion, the ontological, epistemological and axiological commitments of pragmatism are outlined and contrasted with other philosophical stances.

3.2.1. Ontology: What exists?

Ontology is a field of study concerned with the *existence* of objects. Objects are to be conceptualised broadly, thus comprising of tangible as well as intangible matters. Kivinen and Piiroinen (2004) advocate a ‘light ontology’, which synthesises the subjectivity of perspectives and the objectivity of natural

presence. This allows pragmatists to make deliberate choices that appear meaningful in addressing a specific research problem.

Pragmatism rejects a view of reality as being externally valid and independent (Dewey, 1891) in saying reality is never absolute but changing across temporal and spatial dimensions. Metaphorically speaking, reality is 'moving target' (Jonker & Pennink, 2010). Truth therefore takes the form of conditional hypotheses that are context specific but also fallible and thus subject to revision and correction in an attempt to augment its practical value (Popper, 2002).

Consequently, the ontological approach in pragmatism is not clear-cut but instead purposively adaptive. Metcalfe (2008) stresses that pragmatic research is open to alternative realities of multiple problem stakeholders. This approach has implications for the selection of a research problem and its solution. Thus, to understand a problem within a complex reality, pragmatism shifts between the two opposing poles of positivism and constructivism. Whilst a positivist approach assumes reality to be objective and existing independent of people's minds, a constructivist approach assumes a multifaceted, constructed reality where problems are socially constructed. Problems are constructed and as such "the product of people and organisations [while] random problems out in the open" (Jonker & Pennink, 2010, p. 6) are out of the reach of human perception and thus construed as non-existent.

Following a pragmatic stance on reality, knowledge has to be useful, i.e. 'actionable information' (Rowley, 2007). New knowledge is the result of reflection, a thought process triggered by the puzzling realisation that what was believed to be true no longer stands the test of experience (Peirce, 1877, 1878). Reflection creates the uncomfortable state of 'psychic entropy' (Csikszentmihalyi, 1991), i.e. mental chaos, which one strives to escape. This process of thinking transforms an 'impression' about reality into 'meaning' by applying different methods to discover, direct, and describe it (Dewey, 1891) as long as they are conducive to solving a problem (Popper, 2002). Not unlike Foucault (2005) who rejects "absolute priority to the observing subject [leading] to a transcendental consciousness" (*ibid.*, p. XV), i.e. a state of being awake and receptive to learning (Heaton, 2017), pragmatists believe in a reciprocal relationship between subject and object. Since actions of both subject (observer) and object (observed)

influence one another, “it [is] impossible to uncover objective or absolute certainty or truth” (Biesenthal, 2014, p. 9).

Tolk (2013) adds that subject-object relationships “are often non-linear [and therefore pose] the real challenge in complex systems” (*ibid.*, p. 17). Hence, the process of scientific discoveries cannot be explained fully by logic, it always entails “‘an irrational element’ or ‘a creative intuition’” (Popper, 2002, p. 9). Pragmatism is thus to be understood as what Kuhn (1970) calls a ‘paradigm shift’ because its ontological commitments dissolve the objectivity-subjectivity dichotomy and add practical relevance as criterion for existence.

3.2.2. Epistemology: How can we know what exists?

Epistemology is a discipline concerned with growing the stock of scientific knowledge, i.e. theories about reality. The quality of theories depends on the degree to which they (1) clearly define concepts, (2) scope areas of applicability, (3) plausibly explain structural relationships, and (4) feature predictive capabilities. Theory building is an iterative process that answers a set of common questions corresponding to these four quality standards: (1) ‘Who? What?’ (2) ‘When? Where?’ (3) ‘Why? How?’, and (4) ‘Is this possible? Is this desirable?’ (Wacker, 1998).

The process of theorising relies on input in the form of proof as well as transformation of evidence into findings through reasoning. Knowledge is the key output of this process. From this formal presentation, one may arrive at two conclusions. First, knowledge equals evidence, moderated by reason. Reasoning accounts for contextual factors that lie between empirical evidence and theoretic knowledge about them. Evidence is necessarily incomplete. It is neither perceivable in its entirety, nor is the ability to perceive equally distributed across individuals. From this perspective, researchers only arrive at credible claims by constructing a theoretic bridge between perception and knowledge. Second, “quality both of the propositional input and of the reasoning process” influence the truthfulness of knowledge (Bird, 2010, p. 8). Williamson (2014) warns of ‘improbable knowing’, which leads to knowledge claims that distort the plausibility one should attach to them. Improbable claims to knowledge are made consciously in the absence of evidence. This behaviour is associated with the so-

called ‘attribution error’ (Ross, 1977), which refers not only to knowledge about objects but also to ‘knowledge about knowledge’ (Taylor, 1956). To sum up, pragmatism embraces the concept of ‘bounded rationality’ (Simon, 1979), which implies the imperfection of knowledge.

Ulrich (2003) moves away from the focus on methodological choices and argues that organisations can only understand and improve complex systems if they follow a process of “critical discourse […] promoting reflective practice” (*ibid.*, p. 325). Reflection encourages communication (Mott, 1996) and learning (Wood Daudelin, 1996). From a pragmatic stance, learning is grounded in the cyclical relationship between reflection and action (Peirce, 1878). The factor that drives all learning processes is the expected practical value of the knowledge they expect to generate.

3.2.3. Axiology: What is the value of knowing?

Axiology is concerned with theories of value (Carson, 2007). Following Hansson (2018) these relate to the three interrelated value dimensions ‘classification’ (good/bad), ‘comparison’ (better/worse/equal) and ‘quantity’ (how good/how bad). Often value statements are not clear and thus call for explanations. *Classifications* refer to subjects and objects with distinct properties. The value of a subject is the outcome of perception and depends on the perspective of the perceiver. This has several implications. Valuation differs and depends on who observes the subject. Further, valuation is dependent of the relationship one has to a subject. In addition, certain aspects of a subject are valued differently from other facets. What is more, other objects affect the value assigned to a subject. *Comparison* is the process of determining the value of a subject in relation to objects. Consequently, value expressions are always made in relative terms. *Valuation in quantitative terms* relies on scales to demarcate ranks, intervals, and ratios. Quantification of value is particularly relevant when determining the usefulness of subjects.

Since pragmatic research strives to solve problems that have practical consequences, the utility of a solution defines its value by classification, comparison, and quantity. The context specific nature of solutions plays a key role in their categorisations (Biesenthal, 2014). Hence, the *perceived* value of a

solution – ‘good or bad’, ‘better, worse, or equal’, ‘position *x* on a scale’ – depends on where, when, how and by whom evaluations are performed. One may imagine a range of combinatorial scenarios resulting from this proposition. On the lower end of this range, the practical value of a solution varies maximally at minimal changes of contextual parameters. On the upper end, the practical value of a solution varies minimally at maximal changes of contextual parameters. The axiological aim of pragmatic inquiry is therefore to maximise the practical value of research findings while acknowledging limitations posed by its context. This implies that solutions are subject to change should this be required to maximise their value.

Table 3-1 contrasts pragmatism with other philosophies of science that are rooted in constructivist and positivist traditions. The following sections discuss how ontological, epistemological and axiological commitments influence the choices of research design and methods.

		Constructivism	Pragmatism	Positivism
Ontology *What exists?*	Characteristic	• Internal • Constructed	• External • Complex	• External • Reductionist
	Focus	• Personal or social relevance	• Practical relevance	• Indifferent
Epistemology *How can we know what exists?*	Evidence	• Narratives • Perceptions • Interpretations	Practical efficacy based on • Perceptions • Observations • Measurements	• Observations • Measurements
	Generalisation	• Limited to personal or social context	• Limited to research context or similar contexts	• Unlimited
Axiology *What is the value of knowing?*	Effect of value	• Binding	• Motivating	• None
	Source	• Reflection	• Reflection	• None

Table 3-1: Key assumptions and commitment of pragmatism in comparison to constructivism and positivism

3.3. Research design

The research design of this study is case-based, primarily qualitative and action-oriented, drawing on a variety of quantitative and qualitative of data collection and analytical techniques to enable a longitudinal, complex and in-depth examination of the main unit of analysis – the SQ process across a sample of commercial vehicle dealerships in South Africa. Its longitudinal perspective facilitates the progressiqulve and inclusive production of useful knowledge about the effective application of the key principles of SD to sustainable SQ in a complex practical setting – the synopsis of the aim and objectives of this research (*see* Figure 3-1).

The research roadmap consists of three consecutive phases of data collection and analysis to address emerging issues and concerns (Rorty, 1963). This phased approach is applied to study multiple cases of SQ processes in different organisations across time, and to explore – involving selected intra- and extra-organisational stakeholders – SQ problems and possible solutions using SD principles (Mookherji & LaFond, 2013).

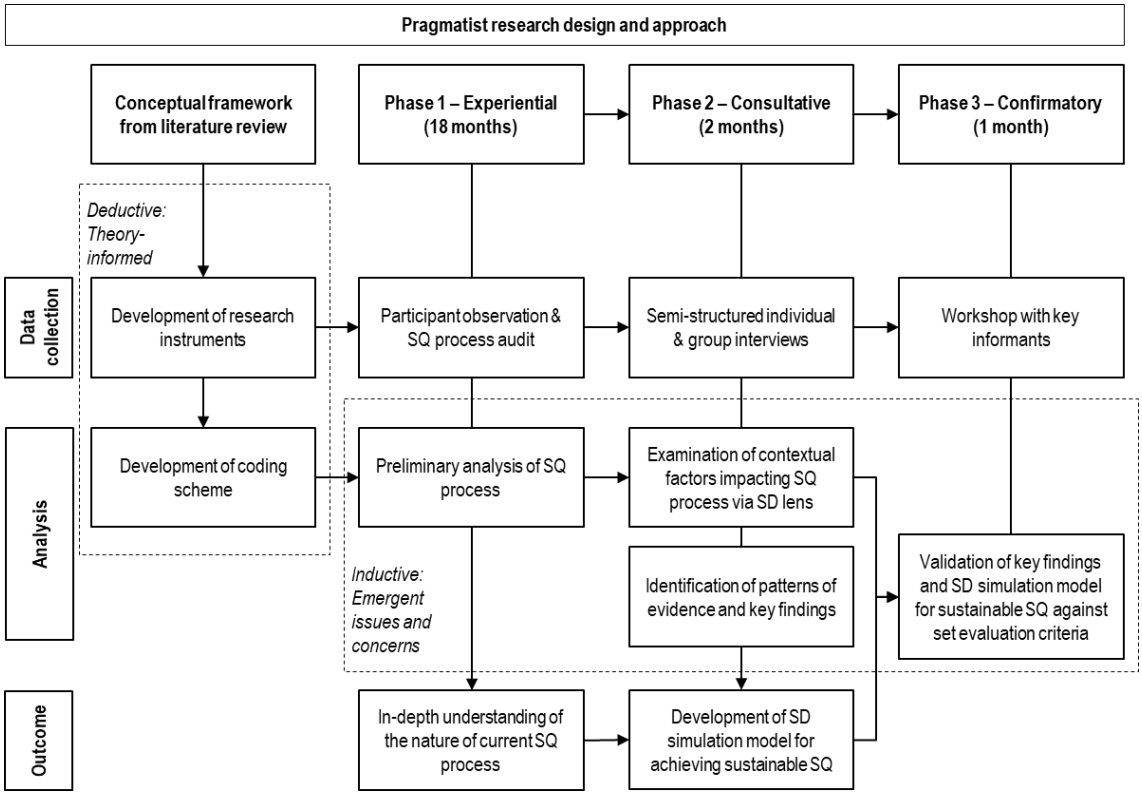


Figure 3-1: Pragmatic research design with inductive approach and longitudinal perspective

Voss *et al.* (2002) argue that research based on case study is particularly well suited for theory building. Case research is often action-oriented, integrates action and reflection cycles, and has thus much more to do with an intervention

than with a relatively passive observation (Midgley, 2003). It is in line with the work of the organisational theorist Lewin (1946, 1947a, 1947b) who argues that positive change depends on intimate situational understanding as well as on goal-oriented action (Burnes, 2004). Consequently, not academic orthodoxies but practical needs governed the choices of research methods employed in this study. The range of issues arising progressively during the course of interventions increases the number of possible methodological choices (Bird, 2010) – frequently leading to the deployment of mixed methods (Johnson & Onwuegbuzie, 2004) and their symbiotic integration (Harrison, 2013).

To establish rigour in this study, the conceptual framework from the literature review informs the development of research instruments for data collection and the coding scheme for data analysis. Further, this study provides an explicit description of the sampling, data collection and analysis processes in the following sub-sections.

3.4. Data collection and sampling strategy

Data collection for this study was guided by the conceptual framework and followed a longitudinal approach, which integrated three voices of research, i.e. the voices of the reflective practitioner, the engaging researcher, as well as the participating and wider audience (Raelin & Coghlan, 2006). A range of company specific documents were reviewed, selected and analysed as complements to the primary data collection process (Bowen, 2009) and to support effective research interventions (Metcalfe, 2008). The approach was translated into three consecutive phases of investigation: An Experiential phase, a Consultative phase, and a Confirmatory phase. Along those phases, qualitative and quantitative research instruments (Feilzer, 2009) were used symbiotically (Sterman, 2001) to produce a progressively comprehensive understanding of the context of research – nature and influencing factors of the SQ process in commercial vehicle dealerships in South Africa – in order to develop an SD-enabled simulation model to optimise the SQ process within this context.

A pilot study, which represents a small-scale version of the main study (Hazzi & Maaldaon, 2015), was conducted to verify the suitability of selected research

instruments and protocols for the achievement of the overall research aim and objectives (Chenail, 2011). The pilot involved two semi-structured interviews with two dealership managers who were accessible to the researcher at the time. During these interviews, two elicitation techniques were tested, an interview schedule as well as conceptual mapping (Crilly *et al.*, 2006). A tentative SD model was derived from the empirical data and a first round of simulations was performed. The pilot led to the refinement of the main study and influenced several choices along the research process, which will be discussed in the following sections.

A *longitudinal approach* was adopted to examine through repeated measurements how and why SQ in South African commercial vehicle dealerships changed over time. Longitudinal research of multiple entities arguably makes theories more robust as it facilitates theory testing (Sonnentag, 2012). George and Jones (2000) advocate the use of time dimensions for better theory building, because time is an "intrinsic property of consciousness" (*ibid.*, p. 659). This implies that human thinking is structured largely by temporal intervals, i.e. past, present, and future. Questions related to time dimensions can lead to insights about subjects (What?), modes (How?) and causes (Why?) of change. One may observe change, i.e. behaviour over time, within and across units. Change can take different forms and happen at various levels. It may take linear or non-linear, continuous, or discontinuous shapes. Consequently, Ployhart and Vandenberg (2010) argue that a minimum number of three measures is necessary to understand the characteristics of change, for only two measures would inevitably lead to a straight trajectory. Cause and effects relationships differ in levels of directness.

Phase 1: Experiential enabled direct and participant observation as well as first-hand experience of key aspects of SQ within the specificity of commercial vehicle dealerships in South Africa. *Phase 2: Consultative* was important for the development of a shared understanding of the object of study – perceptions of mechanisms to improve SQ sustainably – and deepening of knowledge about it using semi-structured individual and group interviews. *Phase 3: Confirmatory* focused on validating the usefulness of applying the principles of SD to improve SQ in the research context through a workshop. Details of each phase are discussed in the sections below.

3.4.1. Phase 1: Experiential

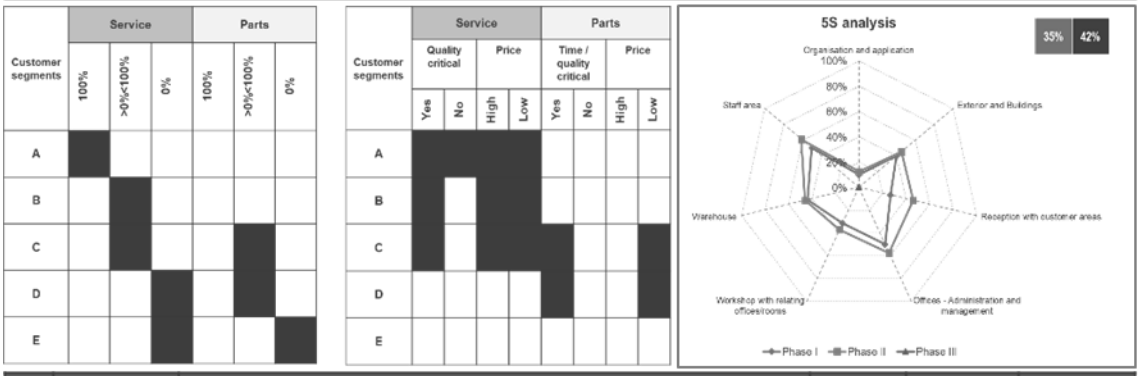
Phase 1 was a longitudinal practical experience of leading a project to improve the SQ process in commercial vehicle dealerships in South Africa. All organisations were part of a retail network associated with the same commercial vehicle brand. During this phase, which lasted for 18 months, the researcher performed both the role of researcher and of practitioner – a circumstance of which all organisations were made aware of. As an expatriate on an overseas assignment, the researcher had no relationship to any dealership prior to the project. Participation in this strategic, nation-wide project was compulsory for all 25 service organisations and their 400 employees. Hence, *sampling* was not necessary.

The purpose of action-oriented approach was to develop a rich understanding of SQ processes within their contexts. It involved the unearthing of nuances that lie beyond the observable. Sometimes these factors had a strong influence over the workings of SQ systems. The anthropologist John Whiting metaphorically defines this research method as follows: “An observer is under the bed. A participant observer is in it” (Guest *et al.*, 2013, p. 78).

Participant observation

Participant observation was used primarily during on-site workshops with 4 to 5 members of dealership management teams as well as the SQ project team members. In his capacity as project manager, the researcher moderated multiple discussions to explore the current nature of the SQ process in every dealership (Luna-Reyes & Andersen, 2003). He steered discussions on strategic and operational SQ matters using SWOT analysis, simple problem structuring tables as well as action plans (*see* Figure 3-2). The Microsoft PowerPoint-administered tools were used as templates in which discussion notes were recorded and projected against a meeting room wall. Every participant had the opportunity to review and revise the records during a session, which typically lasted between one and two hours.

Strengths	Weaknesses
▪ Getting the job done the same day ▪ High customer satisfaction ▪ Good support structure from *brand name* ▪ Good location, close to highways	▪ Closing jobs in time (waiting for customer orders) ▪ Insufficiently categorised quotations
Opportunities	**Threats**
▪ Poorly maintained vehicles (*customer name*) ▪ PDI business ▪ Large internal (*customer name*) business (3,000 contracts) ▪ *Customer name* business	▪ *Dealership name* ▪ Market volatility ▪ Mining closures



No.	Process step	Measures	Resp.	Category	Status
1	Arrangement of appointment	Implement voicemail containing opening hours	xxx	Tool	Open
		Implement vehicle check sheet	xxx	Process	Completed
		Implement capacity planning board	xxx	Tool	Completed
		Install rack system in service reception	xxx	Tool	Completed
2	Preparation of appointment	Use job card checklist	xxx	Process	Completed
		Install pre-picking area for service parts in warehouse	xxx	Tool	Completed
3	Reception of vehicle	Implement tracking card system	xxx	Process	In progress
		Ensure use seat covers	xxx	Process	Open
		Implement clearly marked vehicle parking sections	xxx	5S	Open
4	Work preparation	Implement classification and monitoring system for special tools	xxx	Tool	In Progress
		Implement rack system in workshop	xxx	Tool	Completed
5	Performance	Clean-up workshop floor	xxx	5S	In Progress
		Implement rotational shelf use in defective parts store	xxx	5S	Open
6	Calculation & QA	Use labour codes consistently	xxx	Process	In Progress
7	Billing	Invoice = gate pass	xxx	Process	Open
8	Vehicle hand-back	Handover additional documents, e.g. test reports, copy of vehicle check sheet	xxx	Process	Open
9	Feedback	Conduct courtesy calls for every job	xxx	Process	Open
		Discuss feedback, document and follow-up measures	xxx	Process	Open
		Daily 15-minutes stand-up meetings	xxx	Tool	Completed

Figure 3-2: Sample field notes during workshops with dealership management team

In its purest form, the ultimate purpose of 'participatory research' action to improve a situation that is problematic according to the participants. These, and

not the researcher, determine the process from defining a problem, collecting and analysing data, to deciding on action based on the research findings. Different from the ideal of objective truth, participatory research is about learning through reflection and, in consequence, empowerment of the participants. In practice, the participatory researcher passes on some but not all process control to the participants (Cornwall & Jewkes, 1995). Mackenzie *et al.* (2012) stress that compared to conventional research methodologies the researcher has to be transparent about the agreed research purpose and subsequent process and share this information with the participants.

Nyumba *et al.* (2018) developed a process flow on focus group discussion methodology with the phases of research design, data collection, analysis, findings and reporting. Research design covers a number of preparatory activities, such as purpose definition, focus group composition and discussion frequency. The most salient activity in research design is the identification of participants “since the technique is largely based on group dynamics and synergistic relationships among participants to generate data” (*ibid.*, p. 22). The selection of methods employed in the data collection phase depends primarily on contextual specificities but should not entirely rely on verbal data.

SQ process audit

In his capacity of *SQ process auditor*, the researcher collected primarily quantitative data in a controlled way. An audit checklist developed by the commercial vehicle maker and consisting of 200 items was used to evaluate the SQ process in a dealership. A standard audit took about two days to complete and was performed in every dealership and at least three times during the project phase. SQ process evaluations were captured in Microsoft Excel tables, discussed with the project team, and then presented to the management of the dealerships (*see* Figure 3-3).

Process analysis evaluation				
No.	Process step	Phase 1	Phase 2	Phase 3
1	Arrangement of appointment	41.9%	74.2%	78.5%
2	Preparation of appointment	25.5%	48.9%	57.4%
3	Reception of vehicle	71.6%	75.5%	78.1%
4	Work preparation	59.1%	40.9%	68.2%
5	Performance	57.1%	57.1%	65.7%
6	Calculation and quality assurance	37.1%	91.4%	91.4%
7	Billing	50.0%	66.7%	66.7%
8	Vehicle hand-back	55.6%	55.6%	88.9%
9	Feedback	36.4%	63.6%	100.0%
OVERALL EVALUATION		49.8%	63.6%	73.5%

Evaluation of interface analysis			
Interfaces	Alpine	Phase 2	Phase 3
Arrangement of appointment v. Preparation of appointment	37.9%	65.5%	72.4%
Preparation of appointment v. Reception of vehicle	50.0%	52.2%	58.7%
Reception of vehicle v. Work preparation	77.8%	77.8%	77.8%
Work preparation v. Performance	53.8%	38.5%	53.8%
Performance v. Calculation & QA	64.3%	64.3%	64.3%
Calculation & QA v. Billing	78.6%	100.0%	100.0%
Billing v. Vehicle hand-back	61.5%	61.5%	61.5%
Vehicle hand-back v. Feedback	100.0%	100.0%	100.0%
Feedback v. Overall process	100.0%	100.0%	100.0%
OVERALL EVALUATION	60.2%	64.8%	69.9%

Figure 3-3: Sample SQ process audit results

This structured manner of data collection and validation allowed for fairly objective process analyses and reliable comparisons between organisations and SQ process levels across time (Saunders *et al.*, 2008).

3.4.2. Phase 2: Consultative

Building on Phase 1 and informed by the pilot, Phase 2 was concerned with the consultation of SQ experts about the mechanisms underpinning sustainable SQ – leading to the development of an SD simulation model. The 13 informants were *sampled* purposively based on their information power (Malterud *et al.*, 2015), which rest on two criteria: Organisational perspective and SQ expertise. Phase 1 revealed that one of the sources of complexity of SQ in the research context was the interplay between different organisational layers. The pilot showed that expertise and articulateness of respondents were the main levers of effective interviews. The chosen sample size was adequate because of the narrow aim of the case-based, action-oriented study, which is underpinned by solid theories.

Customers were not interviewed due to time constraints but also because large-scale customer survey data was made available to the researcher. The data clearly revealed customer expectations and which were considered in the design of the SQ process that was audited in phase 1. Alvarez *et al.* (2012) argue that secondary data can in certain instances lead to more effective knowledge creation than collecting data using bespoke research instruments with typically low response rates. Therefore, the researcher decided to concentrate on collecting primary data within the service provision sphere, was seen as the focal point of this research project.

The typical informant had around 20-years' experience in SQ processes in the automotive industry in one or more of the three organisational areas of design & rollout, implementation & execution (*see* Table 3-2).

	SQ process experience of interviewees			
Interviewee	**Design & rollout**	**Implementation, support & control**	**Execution**	**Length in years**
I-1		X	X	15
I-2		X	X	30
I-3			X	30
I-4		X	X	30
I-5			X	15
I-6	X			20
I-7	X			5
I-8	X			20
I-9		X	X	20
I-10	X	X	X	30
I-11		X	X	15
I-12	X			20
I-13			X	30

Table 3-2: Professional experience and perspectives (X) of interviewees

Five SQ experts had experience in designing and rolling out SQ processes and systems for South Africa and other markets – international OEM perspective. Six SQ experts had experience in implementing, supporting and controlling SQ processes in the market – South African importer perspective. Nine SQ experts had experience in executing SQ processes in dealerships – South African dealership perspective. All respondents held senior management or expert positions in their organisations which allowed for insightful descriptions of the SQ process from diverse angles.

SQ processes are not isolated sequential arrangements of events but are linked to time and space, thus their exploration necessarily involved the search for patterns and also their underpinnings, which are rooted in their context (Pettigrew, 1997). Hence, the process of sustainable SQ has to be studied within the context of its organisational (Perlow *et al.*, 2002) and environmental settings (Miller & Friesen, 1983; Mintzberg *et al.*, 1976).

Surveying different stakeholders is in accordance with the principles of pragmatism, which emphasise the need to illuminate a problem of different perspectives in order to develop workable solutions (Metcalfe, 2008). The mix of

experiences and resulting perspectives was necessary to do justice to the complex challenge of sustainable SQ processes.

Semi-structured individual and group interviews

Semi-structured individual and group interviews were conducted over the period of two months both on-site in South Africa and Germany and over the phone. Individual interviews lasted for about 45 minutes, group interviews for about 90 minutes. This method was chosen because the researcher wanted to gain and in-depth understanding of the barriers and facilitators of the SQ process from different viewpoints. The structure was kept flexible to facilitate the exploration of issues and concerns emerging during the interviews. See Appendix B for the interview schedule and Appendix C for a sample interview transcript.

The interview data forms the basis for the development of a conceptual model which informs the creation of an SD simulation model. As pointed out by Robinson (2008), a conceptual model represents the abstracted design of a real system, which strongly influences the outcome of an SD simulation project. Conceptual models are based on viewpoints of experts and clients as well as the modelers – rooted their individual mental models, which Doyle & Ford (1998) define as “a relatively enduring and accessible, but limited, internal conceptual representation of an external system whose structure maintains the perceived structure of that system” (p. 17). In support of a rich, multifaceted understanding of the SQ problem a qualitative approach to data collection was chosen. Quantitative survey-based data collection methods would not have produced the same level of depth required to adequately address the complexity of the problem. See also section 2.3.2 for a brief discussion on the modelling process.

3.4.3. Phase 3: Confirmatory

Phase 3 took lasted for one month and its purpose was to get feedback from an SQ expert on the conclusions drawn from the preceding phases. It served as a basis for reflection on the usefulness and application of the key principles of SD to improve sustainably SQ in the context of commercial vehicle dealerships. The expert was sampled purposively based on his longstanding practical experience

with designing and implementing SQ initiatives for the South African and other markets.

Workshop with a key informant

Qualitative data was collected during a workshop with a key informant which lasted for around 180 minutes. The researcher presented the key findings from the previous research phases as well as the SD simulation model (*see* Figure 4-12; Appendix D). The presentation was followed by a discussion around the validity and practical use of the intervention as well as ways to operationalise sustainable SQ policies in line with the principles of SD.

A workshop was conducted in conjunction with selected modelling and simulation techniques. The action-oriented, participatory method of a workshop was chosen as it facilitates fruitful exchange of viewpoints of participants about a specific topic (Nyumba *et al.*, 2018). Due to time constraints no fully-fledged model-building workshop was conducted. However, the use of the prepared SD model as boundary object and basis for simulations runs during the workshop facilitated the conversation between the researcher and the participant (Fuglseth & Gronhaug, 2002) and created some ownership of the concepts and learning (Carlisle *et al.*, 2016).

3.5. Data analysis

The purpose of this section is to describe how the data collected in the three phases discussed above was analysed to address effectively the main research question:

> *How can the principles of system dynamics be applied to sustainably enhance service quality in commercial vehicle service dealerships within the context of the South African automotive industry?*

Embedded in an exploratory, case-based and action-oriented research design, the data analysis made use of methodological triangulation (Turner *et al.*, 2017) to enhance the credibility of research findings (Jick, 1979). A coding scheme – rooted in the conceptual framework from the literature review – was developed to

facilitate an incremental growth of knowledge across the three research phases. It followed an integrated approach, beginning with broad code types in phase 1, which framed the sub-codes that were developed from the data gathered in phases 2 and 3. The number of codes and sub-codes was iteratively determined by the empirical data, the conceptual framework as well as the research objectives (Elliott, 2018). The following subsections present the analysis methods employed in each phase.

3.5.1. Phase 1: Preliminary analysis of SQ process

The purpose of this phase was to develop an in-depth understanding of the nature of the current SQ process based on a sample of service organisations using mutually complementing quantitative and qualitative techniques of analysis. These techniques were deployed to extract in-depth knowledge from primary data in the form of field notes and audit results as well as to secondary data in the form of company policies and tools (Saunders *et al.*, 2008). Issues emerging from this phase informed the structure and process of the succeeding research phases.

The quantitative analysis describes the SQ process numerically based on observational data from 25 dealerships. The analytic focus was placed on understanding the key systemic drivers of the SQ process and its dynamic behaviour over time. The data analysis process followed three consecutive phases of data preparation, exploration and description using different statistical techniques. The data preparation phase began with a distinction of the different data types, namely categorical and numerical. The data was then brought into a tabular format. Textual data from SQ audit checklists was weighted, normalised and assigned to service system categories, which had been discussed in the literature review. Sanity checks were performed to avoid errors. The second phase included an examination of individual variables by means of frequency distribution charts to present relative, systemic importance, cross-tabulations to show systemic correlations between variables and line graphs to show dynamic behaviour over time. In the third phase, the data was discussed in terms of averages and dispersions. The quantitative analysis provides the diagnostic focus of the qualitative analysis.

The field notes from strategy workshops in 25 case dealerships were first organised, i.e. dispersed information was pooled in a single table of more than 400 lines. Then, the notes were coded inductively, consolidated and assigned to emerging categories, in alignment with the key themes from the literature review (Flick, 2009). Primary data was combined with documentary analysis to support an in-depth inquiry of the SQ process within its context (Denzin, 2012). The resulting framework and codes structures informed the succeeding research phase.

3.5.2. Phase 2: SD-enabled examination of contextual factors impacting SQ

The purpose of this phase was to develop an SD simulation model for achieving sustainable SQ. Based on the findings and emerging codes from phase 1, contextual factors impacting on SQ were examined via the SD lens. Synthetic, closed-looped and dynamic patterns of evidence and key finding identified informed the construction of the SQ system model (Warren, 2005).

The qualitative data collected during semi-structured interviews with 13 informants was first transcribed. Based on the transcripts sub-codes were created which were then allocated to codes that emerged from phase 1.

3.5.3. Phase 3: Validation of key findings and proposed simulation model

The purpose of this phase was to validate the key findings and the SD simulation model for sustainable SQ against set evaluation criteria (Huz *et al.*, 1997) and to inform the development of an operational framework. The recorded workshop data was summarised and contrasted with the findings from the previous two phases.

3.6. Evaluation of findings

In line with the pragmatist philosophy, in addition to conventional quality criteria of rigour in qualitative research – generalisability, reliability, and validity – the findings are also measured against action stimulus.

The case-based, primarily qualitative and action-oriented research design adopted for this study is criticised by positivists who question the generalizability of case study findings (Yin, 2013), arguably the key objective of any research. In spite of the absence of robust statistical evidence, key factors and relationships can be extracted from one case and transferred to similar but also dissimilar cases (Mookherji & LaFond, 2013). To test the completeness and internal validity of the findings, sources of evidence were triangulated across the three data collection phases (Bryson, et *al.*, 2016; Crilly *et al.*, 2006). Further, to test the external validity of the findings they are compared with contradictory and corresponding literature (Yin, 2013). Reliability is tested following standard protocols and making documentation procedures transparent (Flick, 2009).

3.6.1. Generalisability

Generalisability of a theory is defined by its applicability to domains other than the empirical context from which it was developed (Wacker, 1998) and is based on 'linear and mechanistic thinking' (Houghton, 2008). Rooted in the tenets of systems thinking, this study adopts a concept of generalisability that embraces the *complexity of a system* within which non-reducible elements are synthesised to produce a holistic and multifaceted explanations of the problem researched (Ackoff, 2001). Concerning the *dynamic behaviour of a system*, Yin suggests 'analytic generalization', which examines the causal relationship between an action and the result it produces. Instead of providing numeric explanations for effects, generalisations should rather be concerned with conceptual quality and high level of contextualisation. "This means: (a) documenting (and interpreting) a set of outcomes, and then (b) trying *to explain how those outcomes came about*" (Yin, 2013, p. 322). In conclusion, the generalisability of the theory emerging from this study is to be evaluated in terms of the appropriateness of its 'systemic foundation' (Houghton, 2008) to explore dynamically complex situations (Eden, 1994).

3.6.2. Reliability

Reliability indicates the degree to which a method produces consistent results and the degree to which procedures are transparently documented. Standardisation of data collection methods – such the use of SQ process check

lists and strategy analysis frameworks for participant observation and guidelines for semi-structured interviews – increase the level of reliability (Flick, 2009). Results produced by the chosen data collection and analysis methods are certainly less reliable than those from laboratory experiments as the latter are almost free from situational influences. Knowledge of the interviewees is necessarily limited (Simon, 1979). Further, different knowledge levels are believed to translate to distinct problem structuring capabilities (Smith, 1988). However, the triangulation of data types (texts, graphs, numbers) as well as of methods (qualitative; quantitative) arguable increase reliability and lead to more comprehensive findings (Jick, 1979).

3.6.3. Validity

Validity is determined by the degree variables and relationships are measured by a method (Wrona, 2005). Using text interpretation as an instrument to define conceptual building blocks and link can lead to misconceptions. The chosen longitudinal approach led to considerable empirical evidence from a large number of service organisations and diverse SQ process stakeholders from the experiential and consultative phases. To enhance completeness and soundness of the key findings from these phases the researcher carried out a third, confirmatory phase with an SQ experts using graphic elicitation techniques to encourage his input and to leverage collaborative advantage (Bryson *et al.*, 2016; Crilly et al., 2006).

3.6.4. Action-stimulus

Following a pragmatist philosophy, the value of research is in principle determined by the stimulus for action it generates (Reason, 2003). (Peirce, 1878) goes even further in arguing that the “whole function of thought is to produce habits of action” (*ibid.*, p. 290). Therefore, the value of this study is to be evaluated by the positive impetus for practice it provokes. Shaw (2015) distinguishes between four types of change resulting from systems thinking based interventions: ‘change in thinking’, ‘change in approach to problem solving’, ‘change as personal development’ and ‘change in worldview’.

3.7. Reflexivity

This section discusses the key concerns during each of the three, sequential research phases: Objectivity, engagement, and usefulness.

3.7.1. Phase 1: Objectivity

The key concern during phase 1 was objectivity. It refers to an ideal situation in which the researcher examines his topic without any subjective influences such as feelings, beliefs and opinions. Popper (2002) argues that such a condition is almost impossible to achieve. Participant observation is by design interventionist (Midgley, 2003) because the researcher generates – through his personal involvement – data based on descriptions of events, surveys of subjective views and quantified listings (Jackson, 1983), which primarily leads to interpretivist analysis (Guest *et al.*, 2013). Standardised data collection protocols, clear rules for data analysis and logical conclusions enhance the degree of objectivity (Brühl & Buch, 2006). Along such lines, the researcher applied the same data collection formats to all case organisations which allowed him to include all data points in unified qualitative and quantitative analyses.

3.7.2. Phase 2: Engagement

The key concern during phase 2 was the engagement of research participants through a ‘discursive-dialogical reconstruction’ of the SQ problem, which sought to link prior knowledge of the researcher to practical knowledge of the participants (Witzel & Reiter, 2013). Prior knowledge was based on theoretic constructs as well as on the issues emerging from phase 1. The researcher applied a relatively light structure to the interviews in support of an open exchange of viewpoints. Where suitable anecdotes from the preceding participant observations were included in the interviews to encourage or probe responses of interviewees. This approach is not only more engaging but arguably more suitable for the processes of theorising and modelling (Wengraf, 2001).

3.7.3. Phase 3: Usefulness

The key concern during phase 3 was usefulness, which refers to the practical relevance of SD approach as a tool to sustainably improve SQ. In their study on

‘strategy tools-in-use’, Jarzabkowski & Kaplan (2015) argue that the usefulness of tools can be evaluated along the phases of selection, application and outcomes by their affordance and agency of actors. Affordance refers to possibilities and constraints a tool provides (Greeno, 1994). Agency of actors refers to the choices of delegates which are not always perfectly rational because “physical, social, temporal, or experiential barriers separates principal and agent [i.e. the organisation]” (Shapiro, 2005, p. 275). Hence, these factors had to be taken into consideration.

3.8. Ethical considerations

This section addresses ethical concerns that arose during the research and how they were dealt with. It is organised into the subsections access, collection, findings and storage.

3.8.1. Access

The Research Ethics Committee of Napier University reviewed the research project before the start of the field study. Additionally, the researcher took measures to guarantee integrity. Prior to each phase, the researcher informed the participants about his dual roles of project manager and researcher. He disclosed that for this research, he acts in his capacity as a self-funded, independent research student carrying out a study as part of his DBA programme.

He clarified the purpose of the study and – in the case of interviews and workshop – the voluntary nature of participation and the right to withdraw at any given time. The participants were informed that their identities would be anonymised, and data would be stored on an encrypted storage devise.

Phase 1 – Experiential. The researcher made a verbal statement in each organisation at the beginning of an intervention that besides his role as project manager. All participating organisations gave their verbal consent.

Phase 2 – Consultative & Phase 3 – Confirmatory. The researcher informed the respondents via phone and email prior to the interview and workshop about the purpose of the study. Also, the interviewees received as an email attachment with

the consent form (*see* Appendix A), which they have signed in most cases. However, recorded verbal consent was also considered acceptable.

3.8.2. Collection

The chosen research approach raises primarily three categories of ethical concerns: ‘Unpredictability’, ‘dual role of researcher and consultant’, and ‘insider research’ (Morton, 1999). Following the logic of SD, an intervention in an organisation, just like in any other living system, typically leads to some degree of modification of the entire organisation. The action researcher’s hybrid role of academic-cum-consultant has four implications. First, the dynamic nature of interventions brings along a certain level of unpredictability. Hence, making unconditional commitments to a client can be risky and therefore unethical. The researcher has therefore clearly stated the purpose of the project and offered to share the report with one of the interviewees. Second, since the researcher’s interest in theory development exceeds the client’s immediate requirement to solve a particular problem, the time projected and agreed time commitment was not exceeded. Third, while people in organisations tend to be critical of academic and consultants, as an insider to the case organisations the researcher was known to and to a degree trusted by the participants. Fourth, while there is a conflict of interest between the aims of an academic – to produce knowledge – and of a consultant – to successfully complete a project – the researcher managed the participants’ expectations as to limiting the commitments to sharing a study report.

3.8.3. Findings

While it is extremely unlikely for research subjects to be identifiable, it is theoretically possible by exploring the lead researcher’s professional background and networks. With personal professional information, such as the employer at the time of the study, and case study information it is possible to speculate about participating organisations and individuals. Organisational and individual names were made anonymous and identifiers excluded from the study to the possible extent. Should standard approaches of anonymization, like the use of pseudonyms, be insufficient, the researcher abstained from using the data (Wiles *et al.*, 2008).

3.8.4. Storage

Any handwritten notes will first be digitised and then destroyed. The digitised data will be stored on a password-protected USB flash drive. Only the lead researcher will have access to it. The data will be kept until the end of the study, projected for quarter 2, 2020. Thereafter, the data will be deleted from the storage device before the latter is destroyed.

CHAPTER FOUR DATA ANALYSIS

4.1. Introduction

The purpose of this chapter is to discuss via the SD lens – synthesis, closed-loops, dynamics – the SQ process within its context to identify patterns, emergent issues, and key findings. This analysis triangulates different sources of evidence collected during the three action-oriented, case-based data collection phases, which provide a credible account and useful insights into the research phenomenon. This approach aligns with the pragmatist position, which advocates the use of methods that "offer the best opportunities for answering important research questions" (Johnson & Onwuegbuzie, 2004, p. 16). Evidence emerges from the analysis of the primary data, complemented by secondary data and is grounded in theory, consistent with conceptual framework resulting from the literature review.

The chapter begins with a discussion of the systemic nature of the SQ process in the context of commercial vehicle dealerships in South Africa. Deploying the model of the *service co-production system* discussed in the literature review (*see* section 2.2.2) as analytic framework, the first subsection examines, based on SQ process system components and their interactions, which were derived from the analysis of field notes and company-specific policy documents and manuals. The second subsection discusses the behaviour of SQ systems over time observed during audit interventions in the South African case organisations, distinguishing between small and large dealership operations. The findings are contrasted with the literature on organisational change. The chapter proceeds to discuss contextual factors impacting on the SQ process, which emerged from SQ expert interview data, aligned with the concepts of static and dynamic capabilities discussed in the literature review (*see* section 2.4.1) as prerequisites for sustainable service operations. To advance the preceding analyses, the chapter presents the development of a prototype SD simulation model for sustainable SQ. The model is then employed to perform simulation runs, which generate data on the behaviour over time of an SQ process system. Three policy scenarios are

simulated and analysed. The chapter concludes with a validation of the SD simulation model and an analysis of way to operationalise it.

4.2. The systemic nature of the SQ process in commercial vehicle dealerships

A useful way to illustrate the SQ process is a basic flow chart, which contains the main phases arranged in sequential order (Calabrese & Corbò, 2015; Fliess & Kleinaltenkamp, 2004). Derived from the analysis of company manuals and SQ audit checklists used in phase 1, Figure 4-1 displays nine core phases that apply to the SQ process in commercial vehicle dealerships. The links between the phases imply causal dependencies between a phase and its successor. Each phase is dominated either by the input of the customer or of the service provider. Hence, the effectiveness of the SQ process relies on systemic interplay of phases, the links between them, and the input of both customer and service provider.

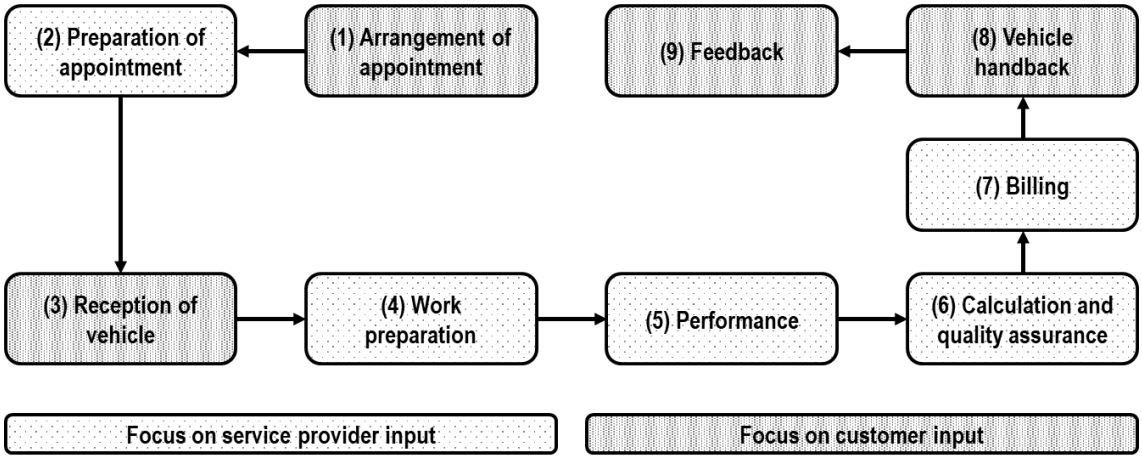


Figure 4-1: Customer-service provider interaction along the SQ process phases

4.2.1. SQ system core components and their interaction

The effectiveness of the SQ process depends on core components of a service system and their interactions. Figure 4-2 illustrates seven generic elements of a service system, four on the side of the service provider and three on the customer side, which were applied to a standardised SQ process followed by commercial vehicle dealerships. The square size illustrates the result of weighting each system component along the SQ process steps and indicates their relative

contribution to the overall process. The analysis shows that the service provider can largely influence the effectiveness of the SQ process. It is further evident from the process analysis that non-physical elements play a larger role in service provision than physical ones. In the customer category, information appears to be the most important ingredient to the SQ process – in terms of relative involvement. These findings were contrasted and found to be in line with the findings from phase 2. In the following, each component within the two categories is discussed.

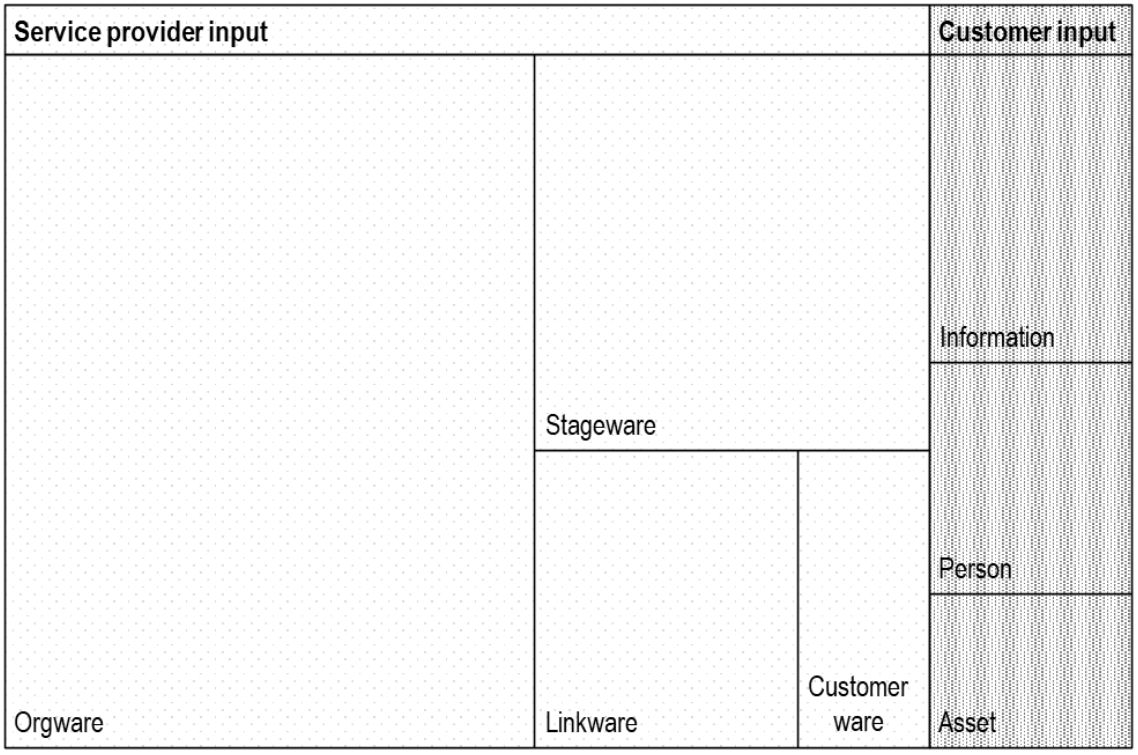


Figure 4-2: Service system components and their contribution to SQ

Core components: Service provider input

Orgware refers to the organisational functions and their service capabilities that drive the SQ process. A dealer principal heads the organisation of a dealership. His direct reports are a service manager, a spare parts manager and a finance manager. The service manager oversees two teams, a team of service advisors and a team of supervisors with technicians. The spare parts manager is responsible for the supply chain, as well as the marketing and sales of spare parts. The finance manager heads the financial accounting and controlling areas in a dealership. In South Africa the educational background of service employees on any level of commercial vehicle dealerships is much less formalised than in

European markets. Based on observations, only about 50% of technicians have completed a formal apprenticeship. In administrative area of the business, this rate is even lower. Professional expertise is typically acquired exclusively on the job, often without any mentoring. In large organisations with a staff compliment of more than 25, individuals fill only one role, which allows them to specialise in their field, but may find it difficult to perform functions outside their area of expertise and to understand the entire service system. In small organisations of 25 or fewer staff members, individuals typically fill multiple roles. Here, service employees are forced to improvise and learn through trial and error. Although this approach could potentially be a source for developing service capability, employees typically do not get the time and space to reflect on their learning experiences. This lack of structure and standards in professional development make sustainable SQ processes a daunting challenge because the success of service depends on skilled employees.

Stageware refers to physical and non-physical infrastructures. Physical infrastructure consists of the facility as well as the equipment. From a structural perspective, all case dealerships were quite comparable. A dealership facility typically comprises a building with sections for service administration, customer areas, a workshop with repair pits and service bays and a warehouse for spare parts and special tools. The building is situated on a 6,000-10,000 m² yard, which provides space to manoeuvre and park commercial vehicles. Equipment includes mechanical, electrical and electronical tools required to perform technical services on commercial vehicles, i.e. diagnostics, maintenance and repairs. It also embraces IT hardware and software as well as other administrative tools required to manage the SQ process. Non-physical infrastructure relates to policies that govern the service operation as an organisation and, specifically, the SQ process. On the one hand, there are external policies that the wholesale organisation imposes on its retail network. These refers to physical, IT infrastructure and training standards and amongst others, to claim processing rules for warranty and service contract jobs. On the other hand, there are internal policies that only apply to a specific service provider or a group of service providers. Amongst others, these rules address financial management, such as payment terms, discount schemes, or provisions, but also human resources or health and safety management. The stageware of the case dealerships differed

in terms of building size and standards but also in terms of workflow organisation. The analysis of SQ processes – which will be discussed in the following sections – has shown that *functionality* of physical structures and processes is much more relevant to SQ effectiveness than 'nice-to-have' features.

Linkware refers to customer interfaces that channel the flow of information, vehicles and people. Interfaces take the shape of electronic or paper-based communication tools, i.e. email, website, social media, telephone, forms, as well as the physical shape of specific locations within the dealership to receive customers, driver and the vehicle, i.e. service reception counter, driver rest room, inspection bay, etc. Linkware supports Customerware.

Customerware refers to the management of customer touch points along the SQ process with high levels of interaction between the service provider and the customer or his driver, i.e. when the customer provides input. The interaction can be divided into mandatory and optional elements. Mandatory input concerns the integration of customer inputs essential to identify and resolve the technical service problem at hand. The description of a rattling engine sound but also the provision of order confirmations are examples. Optional input is not vital from a technical point of view but relevant to an effective SQ process. Confirmation of a scheduled maintenance appointment as well as feedback after service delivery are examples.

Core components: Customer input

Customer input can be of personal, physical and informational nature. *Personal input* relates to the involvement of a customer or the vehicle driver on the premises of a dealership in different phases of the SQ process. The *physical input* is the commercial vehicle or a major aggregate, e.g. an engine or a gearbox. *Informational input* pertains to administrative (e.g. appointment scheduling), commercial (e.g. order confirmation) and technical (e.g. problem description) processes.

The major challenge with regards to customer input relates to the complex coordination of the different stakeholders along the SQ process (Basole & Rouse, 2008). Usually, the customer and the driver are different persons. The customer owns and manages a fleet of vehicles and therefore makes commercial decisions

but generally only interacts with a dealership over the phone or via email. The driver provides – to the individually possible extent – technical information to the dealership staff in person but has little to no authority to take decisions. This imbalance in information and decision power frequently leads to ineffective and erroneous SQ process transactions due to delays and misunderstandings in the communication between the process stakeholders. Cultural and linguistic differences create additional barriers to sharing information and knowledge. What is more, King *et al.* (2007) argue that in the South Africa context "knowledge sharing often becomes a power play" (*ibid.*, p. 285).

Sociotechnical SQ system

Figure 4-3 models the sociotechnical SQ system of commercial vehicle dealership. It illustrates the links between the core components that have just been discussed. Four main conclusions can be drawn concerning the relationships within the SQ system. First, all major components are directly or indirectly connected – indicated by two-headed arrows, which emphasise the systemic nature of dealership operations. Second, major links (indicated by thick arrows) and minor links (indicated by thick arrows) can be found between and within service system components, which imply the existence of subsystems. Third, social interaction within a service organisation, a customer organisation and between these entities is intense. Lastly, these interactions can lead to dynamically complex behaviour.

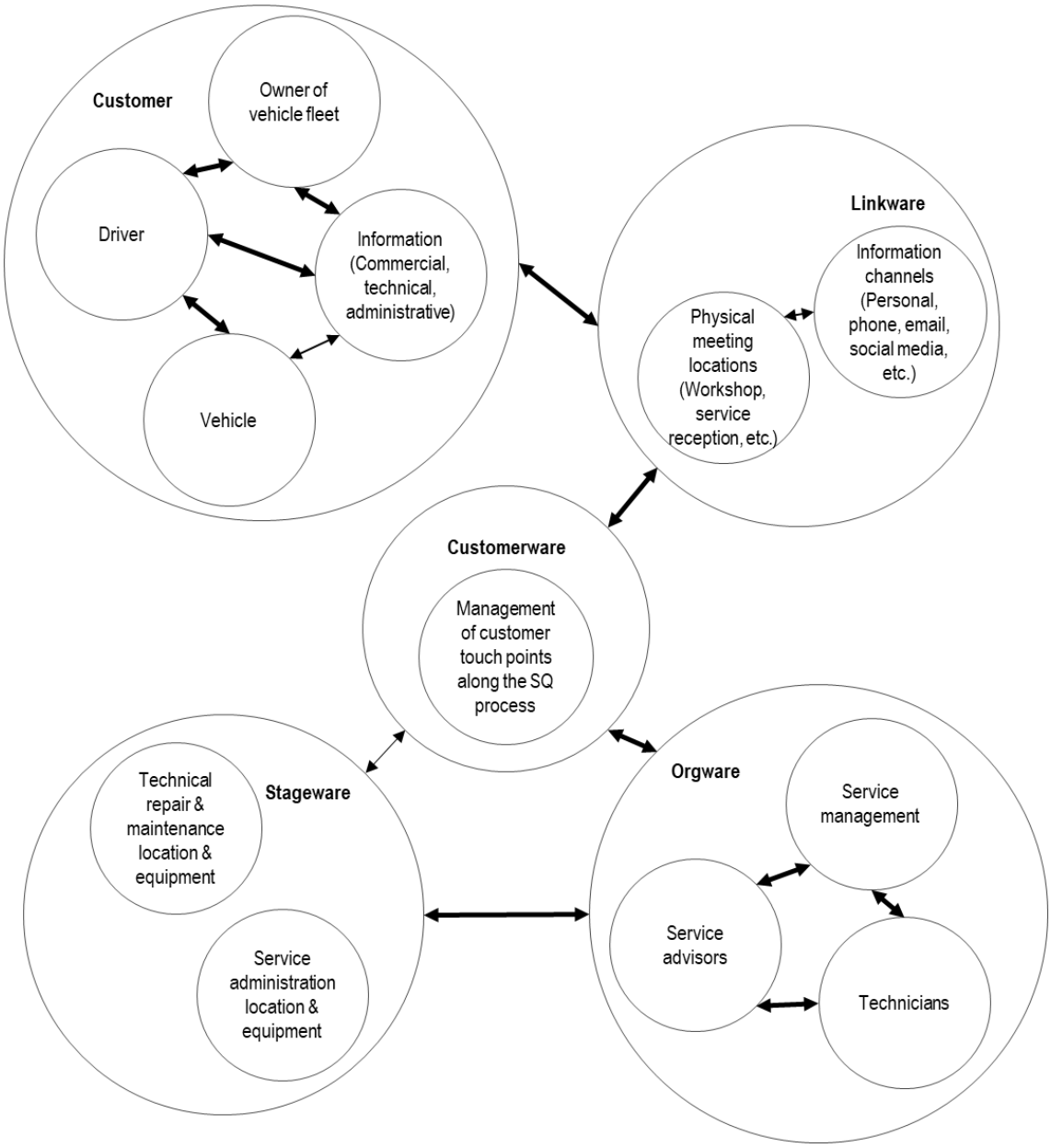


Figure 4-3: Sociotechnical SQ system model of a commercial vehicle dealership

The following section examines, based on the 25 case dealerships, how the reconfiguration of and investment in service systems components translated into changes of SQ process effectiveness over time.

4.2.2. SQ process dynamics

As already mentioned in the previous chapter (section 3.4.1), in his capacity as project manager the researcher coordinated an organisational change programme that affected the core components of the service systems of the 25 South African case dealerships. Every dealership received the same treatment in terms of assessments, trainings, recommendations and support. The analysis of the SQ process effectiveness, which was based on audit results from research

phase 1, showed that two classes of dealerships emerged. The data revealed that a distinguishing factor was dealership size. Nine South African dealerships were in the *small dealerships* group and sixteen were considered *large dealerships* based on their staff compliments. A comparison between small and large dealerships was drawn with a focus on three measures regarding SQ effectiveness: Initial level, rate of change, final level.

Initial level

The initial level refers the SQ process effectiveness measure recorded during the first audit of a dealership prior the implementation of changes to the SQ process. The boxplot diagram in Figure 4-4 shows that small dealerships have a median level of 48%. which is slightly lower than that of large dealerships with a median level of 52%. With regards to the inter-quartile range, it is slightly smaller amongst small operations with 45% to 56% compared to 46% to 60% amongst large ones. A greater difference between the two groups can be observed when looking at the dispersion including outliers. Both lowest (41% compared to 37%) as well as highest values (68% compared to 85%) of large companies are less extreme in small operations.

One can conclude that typical dealerships operate at comparable SQ process effectiveness levels irrespective of their size. However, the group of small service operations is more homogeneous than large ones. It appears that only some large organisations benefit from their advantages in terms of branding, standardisation, employee pay whereas most small organisations reap their advantages in terms of flexibility and responsiveness (Goldschmidt & Chung, 2001).

Figure 4-4: SQ process effectiveness – Initial levels

Rate of change

The rate of change refers to the compound average level improvement from the first to the last SQ process audit. The expected number of audits was three to reach the desired SQ level. 18 dealerships (14 small; 4 large) met their targets within the allotted number of audits. 7 dealerships (2 small; 5 large) required between four and six interventions.

The boxplot diagram in Figure 4-5 shows that small dealerships have a median rate of 9%. which is significantly higher than that of large dealerships with a median level of 5%. With regards to the inter-quartile range, it is slightly smaller amongst in small operations with 6% to 10% compared to 2% to 8% amongst large ones. A greater difference between the two groups can be observed when looking at dispersion including outliers. The lowest (5% compared to 0%) rate is much less extreme in small operations than in large companies. The highest levels 14% in small and 13% in large dealerships are comparable.

These findings confirm the well-established correlation between company size and inertia (Hannan & Freeman, 1984). Although organisational capacity for change, a concept similar to DCs, is generally associated with greater success of change initiatives but in certain market contexts, e.g. high levels of rivalry, they have no impact (Heckmann et al., 2016). As already discussed in the literature review (*see* section 2.3.1), Stiglitz *et al.* (2016) reason that organisational change is not always the preferred strategy. Their study shows that best-performing or

longest-surviving firms are fact relatively inert and, thus, it encourages a finer distinction between contexts that reward dynamism over inertia. Accordingly, environmental noise should be ignored but major environment change should lead to decisive action. The SQ initiative certainly falls into the latter category. It is therefore interesting to see how differently the two groups of dealerships responded. A possible explanation is that large dealerships tend to operate in highly competitive market areas and dealer principals therefore rated the importance of the SQ initiative accordingly. Along those lines, Fraser *et al.* (2013) found out in a study of Australian automotive dealerships that commitment to SQ tended to be fairly high but the researchers remained uncertain about its translation into practice.

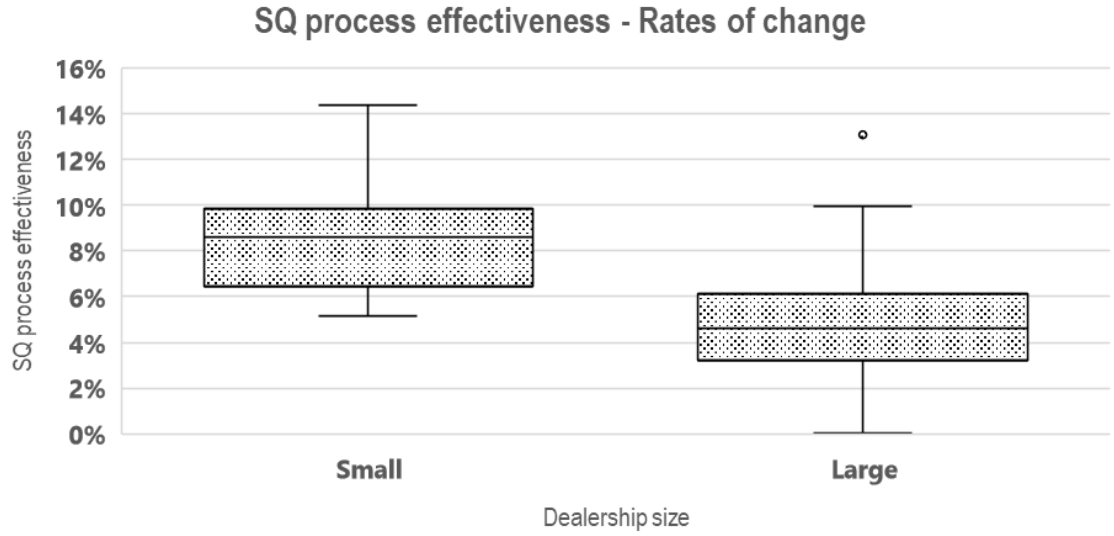


Figure 4-5: SQ process effectiveness – Rates of change

Final levels

The final level refers the SQ process effectiveness measure recorded during the last audit of a dealership at the end of the implementation of changes to the SQ process. The boxplot diagram in Figure 4-6 shows that small dealerships have a median level of 78% which is slightly higher than that of large dealerships with a median level of 74%. With regards to the inter-quartile range, it is slightly smaller amongst small operations with 73% to 83% compared to 71% to 82% amongst large ones. The dispersion including outliers is very similar in both groups with identical lowest values of 64% and similar highest values 90% for small dealerships and 86% for large ones.

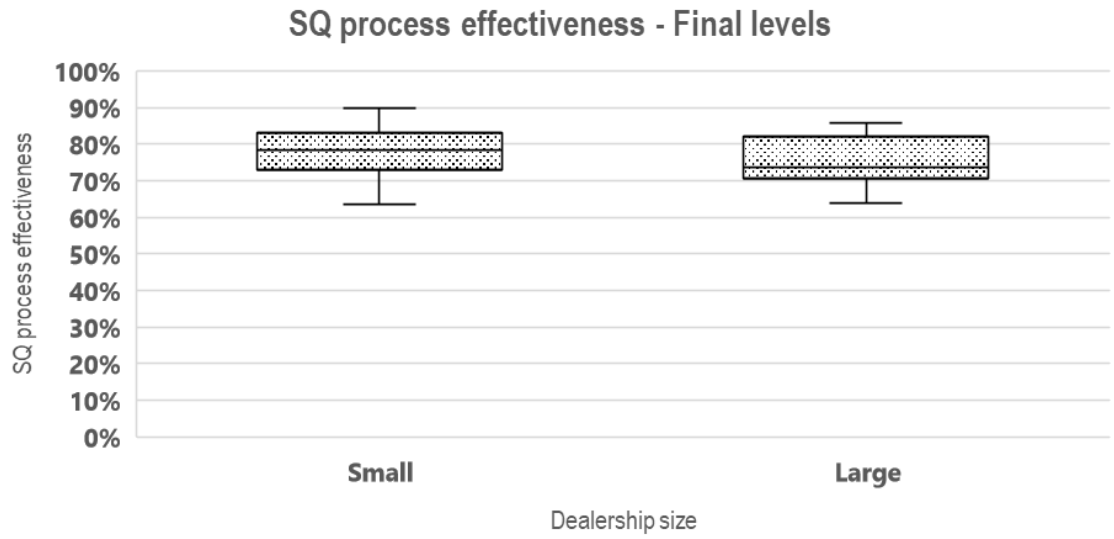


Figure 4-6: SQ process effectiveness – Final levels

In conclusion, the final SQ process levels in the two groups are comparable and show significant improvement from the initial levels which was realised at significantly different rates of change. Carvalho *et al.* (2019) point out that programmes such as the SQ initiative of this study are often used by organisations to meet certain performance goals but are short-lived and do not lead to high SQ process levels sustainably. The following section examines factors addressing this problem.

4.3. Contextual factors impacting on the sustainable SQ process

Along the system boundaries drawn in the previous section, this section examines contextual factors affecting the SQ process in the long term using the key principles of SD as an investigative lens. It presents and discusses the findings regarding challenges associated with sustainable SQ identified during the first two phase research phases. Figure 4-7 showcases the three factor categories, which emerged from the analysis of management workshops notes from phase 1 as well as – informed by the literature review – the service capabilities required to master them.

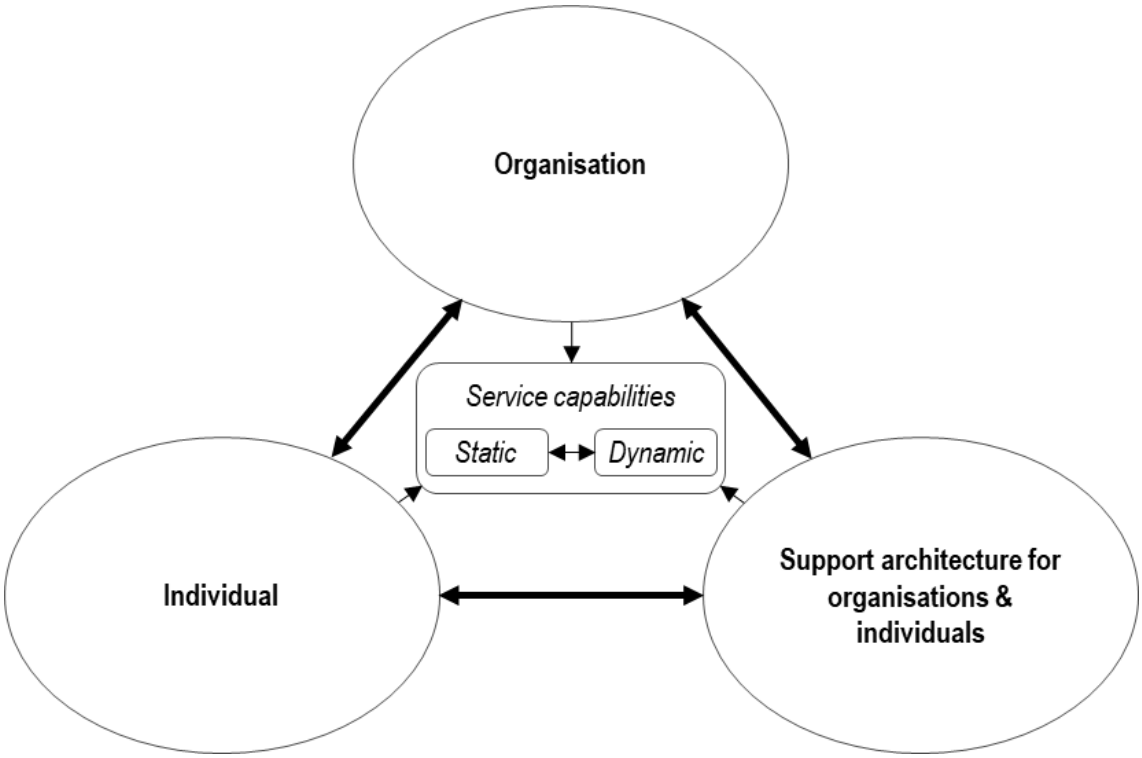


Figure 4-7: Emerging factors of sustainable SQ in South African commercial vehicle dealerships

It illustrates that sustainable SQ in commercial vehicle dealerships primarily relies on individual employees, an organisation as well as a support architecture. Each of these three units pose challenges, which can be addressed applying mutually reinforcing static and dynamic service capabilities. Static service capabilities (SSD) are associated with the concept of exploitation and dynamic service capabilities (DSC) with exploration (Zhang *et al.*, 2014). The two previously discussed concepts are jointly supporting because exploitation can lead to more efficient SQ processes to address existing service demand, translating into a greater space for exploration of new service demand. The transformative capacity of exploration can translation into new SQ processes, which can then be subjected to exploitation. The following sections unpack along these two concepts based on structure of emerging codes, sub-codes – listed in the subsequent figures Figure 4-9 and Figure 4-10 – and quotes from the interviews conducted in phase 2 organised by this code structure. For the sake of anonymity each interviewee was marked as ‘I-’, followed by a sequential number. Table 3-2 provides a brief overview of the professional background of the respondents.

4.3.1. Organisation

Organisational factors refer to the capability of dealership operations to perform the SQ process sustainably. It can be broken down into *Static service capability: Framework of culture, processes & infrastructure* – to meet existing service demand as well as *Dynamic service capability: Flexibility in sensing and seizing opportunities* – to prepare for and deal with new service demand (*see* Figure 4-8).

Organisation
Static service capability: Framework of culture, processes & infrastructure
Systemic management perspective
Operational excellence in dealing with existing service demand
Professional employee recruitment & development
Dynamic service capability: Flexibility in sensing and seizing opportunities
Recognition of emerging service demand
Fast and flexible allocation of resources to address new service demand

Figure 4-8: Organisational SQ factors

Static service capability: Framework of culture, processes & infrastructure

A *systemic management perspective* focuses on the optimisation of the entire SQ system (Choo, 2007) by eliminating constraints within or between its elements (Demirkan *et al.*, 2011).

I-12 shares his understanding of systemic management:

> *"SQ is influenced by several aspects. That means, on the one hand, the processes in our service workshops, the employees who have to provide the service in several roles, service advisor, also the foremen and mechanics but even the systems, IT tools, IT system, the basic enablers for ensuring high SQ in a service workshop and therefore the focus is to provide integrated service systems."*

I-13 highlights the importance of a common understanding in the organisation of the systemic nature of the SQ process:

> *"There needs to be a process that everybody understands and is on board with and they clearly understand what the process involves. Not just their function individually, the whole process. Well, I think that's what's important because we struggled a bit in the beginning where*

> *the workshop would say 'now I've done my bit' and that's a recipe for disaster."*

Similarly, I-12 describes the severe consequences of the absence of systemic management:

> *"If there is no process, no framework, then the service advisor is a trouble-shooter who works very reactive and not proactive in the direction of customer expectations. It begins from the top."*

However, possibly the *existence* of systemic management has a stronger effect on SQ than its *non-existence* because it stimulates the interaction of SQ players which can lead to mutually reinforcing behaviour. Accordingly, SQ process stakeholders benefit from structures that are sufficiently stable to provide guidance but also flexible enough to depart from the standard to accommodate emerging requirements. Benner (2009) argues that the "systematic routinisation of organizational activities" (*ibid.*, p. 473) impedes the ability of organisations to respond to changes in the market environment. Therefore, rapid problem resolution, i.e. the reduction of vehicle downtime, was considered by most respondents a crucial output of such a system, which has to deal with complex processes that require from its stakeholders frequent and immediate decision-making. Hence, *operational excellence in dealing with existing service demand* is paramount.

I-5 defines this concept as follows:

> *"For me, it's all about efficiency, doing the right thing, at the right time, in right place. If you get that combination right, your service towards the customer will grow, will improve continuously."*

I-13 considers discipline a key ingredient:

> *"For me, it's all about discipline in its own right and I've seen the results with the customer. Like it or not, I believe, I firmly believe, the customers like to work with a disciplined environment."*

In such a set-up, all SQ process stakeholders have to have defined authority to make decisions as I-11 advises:

> *“Departmental heads need to trust their employees to make decisions up to a certain level.”*

The decision-making practice in dealerships often looks quite different as I-9 points out:

> *“They don’t make decisions; they are too scared. So, they will always run to the dealer principal [DP], the DP will go to his area after sales manager […] so, that’s a one-day loop […] just to get an answer.”*

From the above quote it seems fair to say that service employees are unable to make decision – a problem, which potentially has different roots. There are probably no clear rules, or they are at least not known. Service employees might not have the authority or the ability to make decisions. Martin (2013) argues that the decision-making process depends on knowledge that organisations acquire in stages via the support of knowledge workers. These need to be skilled in collecting and processing relevant information in order to make technical or commercial decisions. Thus, *professional employee recruitment & development* emerged is a key component of an operational framework. I-12 stresses its necessity as well as its difficulties:

> *“Service is people business, is to have the right people in place to enable them […]*
>
> *[However, it] is really a big challenge to invest in people and to keep them on board” (I-12)*

As a result, some organizations have chosen to hire relatively low-skilled people in whose professional development they invest very little. As I-3 explains that financial constraints are the main reason for his organisation’s recruitment approach:

> *“We can’t always sustain spending that amount of money on very highly qualified service advisors.”*

I-9 expresses his rationale for low investment in development by arguing that:

> *"The moment we train our guy, we develop him, he goes and works for another OEM or works for a customer."*

At the same time, career progression for the function of service advisor is rather limited. I-13 expresses a view several dealerships have;

> *"It is almost looked at in South Africa as a workshop admin clerk. No specialisation in it."*

While some dealerships argue that they cannot afford highly skilled personnel, they seem to ignore the unintended side effects of their actions (Repenning & Sterman, 2001) as I-10 explains:

> *"'You pay peanuts, you get monkeys', which means if you are hiring people according to a certain salary structure or remuneration structure, then you normally already fall behind. You are expecting from people to do the job, and you are not giving them the tools in terms of knowledge, and in some cases, in terms of hardware, to do the job properly."*

It is hardly surprising that staff turnover is high in this complex and demanding work environment for which many service employees are ill prepared.

> *"Often when you go to a workshop, you see new faces and when you asked, what happened, they say, they could not handle the pressure anymore. They buckle under pressure because there is too many things they have to do and too many processes they have to follow."*

Against this background, it is hard to imagine a sustainable SQ process, which relies on an effective service system. On the contrary, it is easy to imagine a vicious cycle (Oliva & Sterman, 2010), in which managers distrust their employees and therefore take most decisions themselves, thus withholding people the opportunity to learn from their decisions and to take on more responsibility. This decision-practice restricts the SQ process in meeting current and future service demand.

Dynamic service capability: Flexibility in sensing and seizing opportunities

Recognition of emerging service demand is based on an intimate understanding of current and potential customers and their requirements. Customer relationship management (CRM) was identified by most respondents as a key challenge

associated with service capability. CRM focuses on the interaction between dealerships and their customer with the aim of acquiring knowledge about customer needs and appropriate ways to deliver services, thus influencing the SQ process (Can Kutlu & Kadaifci, 2014).

I-6 stresses that customer knowledge is essential to spot evolving service needs:

> *"We have to understand the customer needs and the customer approaches, I think, to offer the right products. Also, not every size fits all. I think if you have a better understanding of the customer, it's much more easy to offer the right things."*

Once service demand is identified and an adequate offer was made, a reliable SQ process is key he argues:

> *"Whatever we promise to our customer we should deliver […] and we are transparent about what we are doing."*

I-10 specifies how a reliable SQ process translates into customer loyalty:

> *"Customers are loyal when they know that the job is being done. It is being done in a proper way and there will be no comebacks and that it's all done for a reasonable price."*

Getting a job done in the service context is often difficult because the specific tasks at hand cannot always be predicted. Therefore, the success of a dealership is dependent on *fast and flexible allocation of resources to address new service demand* in order to create service value (SV) (*see* section 2.2.1). Value creation in this context is generally associated with minimising the time a vehicle is out of operation, i.e. the period within which a customer cannot generate income with his asset.

I-3 underlines the importance of SV for customers using the example of breakdowns:

> *"A breakdown is not planned maintenance. Now that's downtime, that's more cost for him than the cost of repair."*

Although breakdowns are common events in commercial vehicle service operations, they share attributes of *new service demand*, which often constitutes

a stress-test to service organisations. A behaviour that is often adopted in such a situation is ‘firefighting’. Such action cannot be called a routine because it is “not highly patterns and not repetitious” (Winter, 2003, pp. 992-993). I-10 describes another recurring problem in a dealership which illustrates the need to flexibly adjust available resources case of imbalance between service demand and supply.

> *“The demand is that, ideally, the invoice is ready by the time the job is ready. But when a front office is under-staffed, you must make a plan to get the front office better staffed and what do you do, you either ask other dealers or you take it from your mechanics. People that are experienced mechanics can actually help out at the front end. If you do that then automatically you are lacking the number of hours that can be invoiced because the person is now working in front office. If you don’t do it, front office is understaffed, first. Second, front office cannot prepare the invoices properly because they have no capacity to do that and at month end of all things, the dealership will fall badly short. So, you are always forced to look at compromises and it happens in some dealerships more frequent in other dealerships less frequent but you are always between a rock and a hard place because you must find a compromise between the hours you have to invoice and the invoices that go out to customers, and the front office being attended to in a way that everything balances out, which normally never happens.”*

New service demand is a fact for every commercial vehicle dealership in South Africa because the needs of customers change. Organisations require DSCs to address new demand effectively, a process which starts with knowing ones customers and their business (Töytäri *et al.*, 2011). As the demand, I-2 suggests the development of ‘contingency plans’ as means to improve DSC through the systematisation of resource allocation processes. Hence, decisions about what to do, when and how are not governed by coincidence but proactively by choice. As several respondents pointed out, a good example of DSC is the implementation of measures to make service demand more plannable. In multiple case organisations, this was achieved through booking processes and structured

internal and external information flows. This shows how DSC helps to develop SSC.

DSC in commercial vehicle dealerships is only achievable through conscious continuous improvement efforts, as the statement of I-8 shows:

> *"You have to realign again and again and again. It's always in after sales, when you think you are there already, you have to start again."*

Consistent with the findings from phase 1 (*see* section 4.2.2), I-10 argues that organisational size has an impact on DSCs:

> *"It's far more scarce and far more difficult for a huge dealership to operate on a very high level [of SQ]. The top scorers [on SQ] are usually the mid-size or smaller dealerships because the relationship to the customer is also more personalised. The big enterprise is like […] a conveyor belt. It must run. Small enterprises have got far more options to do things in a different way, which for the customer he feels that he is being accommodated."*

Similarly, I-2 argues that the non-essential, physical features can even be detrimental to service value (SV):

> *"At one time in South Africa they built all these fancy dealerships because they wanted to entice the customers ... the customers soon realised that they were paying for it ... we are paying for those people, all the mirrors [bells and whistles], in my experience, it didn't make a difference."*

This statement show that commercial vehicle operators are informed customers who can see below the surface. Perhaps even more important than the company's physical infrastructure is the quality of the service team and their ability to understand customers' business and derive resulting service requirements.

4.3.2. Individual

Individual factors refer to the capability of dealership employees to deliver SQ sustainably. It can be broken down into *Static service capability: Process*

orientation – the attitude and skills to address existing service demand as well as *Dynamic service capability: Customer orientation* – to address new service demand (*see* Figure 4-9). In general terms, these groupings apply to all functions in a dealership operation because they all of them deliver services, either to external or internal customers.

Individual
Static service capability: Process orientation
Service-oriented attitude
Sociotechnical skills to address existing service demand
Dynamic service capability: Customer orientation
Problem ownership and proactive communication along the resolution process
Sociotechnical skills to address new service demand

Figure 4-9: Individual SQ factors

Static service capability: Process orientation

Yet, the statement of I-10 summarises individual SQ factors as a combination of 'attitude and aptitude'. Attitude refers to *service-orientation*, i.e. the willingness to provide services and aptitude with *sociotechnical skills to address existing service demand*, i.e. ability to solve regular service problems in a systematic manner.

Referring to a dealership, which is known for its excellent SQ, I-2 explains *service-oriented attitude* as follows:

> *"And you think yourself you know if I did have an issue, I could walk over to him and say 'I wasn't happy with the service today, took too long or whatever…' But everybody knows he's there. He is accessible. So, the management is accessible to the customers."*

Consistent with Elmadağ and Ellinger (2018) who found out that employee pay is positively associated with SQ, I-1 illustrates how service orientation degrades in the absence of extrinsic rewards:

> *"He has been in, as a service advisor, for ten years and he is actually trying to move up [...] but he is being knocked down all the time and his attitude has changed from the person I knew [...] to the person now. He is not helpful."*

Also, I-11 see a link between service orientation and professional achievements:

> *"You are motivated if you are successful."*

Success is naturally a debateable, multi-faceted term but it arguably rests on foundation of skills. I-10 provides a synopsis of *sociotechnical skills to address existing service demand*:

> *"You must enable people to really be capable and able to meet those requirements that are needed to satisfy those different groups [of customers]. In mechanical terms it would be good training exercise, in warranty terms, it would be familiarity with the warranty procedure and the needs related to it. In service reception, it would be the capability to talk to customers, appropriately, have a certain amount of psychological skills and communication skills."*

I-12 confirms the need for double tracked set of skills:

> *"Service advisors need both, handling of customer but also the technical background."*

In South African commercial vehicle dealerships these requirements are often not met by key service functions as I-11 states:

> *"There are a lot of service advisors that have absolutely no technical background."*

In consequence,

> *"They are not equipped to say the right things and do it quickly enough."*

Dynamic service capability: Customer orientation

As discussed in the literature review, service processes differ significantly from production processes with regards to the level of customer involvement (Akter *et al.*, 2016). In consequence, service employees are faced with problems to which no off-the-shelf solution seem to fit. On the one hand, *DSC refers to problem ownership and proactive communication along the resolution process*. On the other hand, it concerns *sociotechnical skills to address new service demand*.

I-2 associate with problem ownership a feeling of responsibility, which he argues is often missing.

> *"They don't feel responsible. They are disconnected so the first thing they do when customer comes in – oh there is breakdown, they see who worked on the vehicle last to see who they can ascribe the blame."*

Owning a problem goes together with *proactive communication along the resolution process* because unforeseen service problems represent a challenge to the service operation and a risk to customers.

I-11 underscores the importance for service employees to communicate internally:

> *"The service advisor mainly has control of what happens on the service side. They don't have control of what happens on the parts side. So, if the communication from the side to them is poor, then, obviously their communication to the customer will also be poor and dissatisfactory for the customer. So, the service advisor needs to have all the necessary, correct information to give it to the customer and, yet it comes down to the customer, he will let you know when he is not happy with the answer he is getting. Anything can happen in between."*

I-9 stresses the importance of continuous feedback to customers:

> *"All of our customers want to be informed continuously. He doesn't know what's going on with his vehicle."*

Information about the progress status is in fact a real necessity. Referring to a conversation with a customer, I-6 explains:

> *"'But if you tell me, at least I have a chance to get another vehicle, to rearrange the tour, to give the driver another vehicle, to do something about it. And the same is in the workshop. When you learn that a part is not there, when you thought, it's there when you looked in the system like it is there, but you learn it's not there. Just give me a call right away. Send me an email or WhatsApp or whatever and tell me. So, I know the truck is coming two days later because you need to*

> *expedite the part first and I know that, then I can manage. If I don't know that, I cannot manage.'"*

Contrary to customer expectations, I-1 warns that:

> *"In many dealerships, there's no immediate action. No sense of urgency."*

A possible explanation of it could be I-2 points out that there is often an information gap in relation to a service problem amongst dealership managers:

> *"When I phone them, branch managers or workshop managers, they say, I've got to come back, I've got to find out. What? You've got to know every single thing. If you ask the pilot, what's the temperature of engine number four, or however they call it, he knows, he checked it two minutes ago, he is on the ball. He doesn't wait till that engine flames up; you know what I mean?"*

Sociotechnical skills to address new service demand are associated with the creative development, rapid testing and deployment of workable solutions (Pasmore et al., 2019). I-2 contrasts his own dealership experience with the common behaviour of employees today when faced with unforeseen service problems:

> *"Many times, a part would break. I take the part to the local engineering shop down the road, get them to weld this thing up or make me a new part. Or go back to the shop and make it myself. I need a shim. What happens today, you got a thousand shims. They don't have the one they need and say they can't do the job. I put the shim on a machine and machine it.*
>
> *[…]*
>
> *But today they find that one bolt is missing and say, 'Now we can't release the truck today because of that. It has to come from [overseas]'."*

This statement exemplifies the need of service employees to negotiate a workable technical solution to a poorly structured technical problem within

organisational or even inter-organisational domains (Trist, 1981). The level of problem structuredness (Smith, 1988; Walker & Cox, 2006) determines the risk of making mistakes; the more structured a problem is, the lower is the risk of error, and *vice versa*. Hence, problematic situations that are poorly structured provide opportunities for learning and, at the same time, make clear that learning is mandatory.

The effectiveness of learning is closely linked to the ability to question the assumptions underlying one's existing practice and to embrace norms that accept making errors and learning from them (Argyris, 1976, 1977, 1991).

From the observations and interviews it becomes clear that many service employees do not find themselves working in an environment that encourages trial-and-error learning – a situation, which calls for a strong support structure.

4.3.3. Support architecture for organisations and individuals

Support architecture for organisations and individuals refer to the capability of support structures to enable sustainable SQ processes. It can be broken down into *Static service capability: Framework of standards, processes & systems* – to enable meeting existing service demand as well as *Dynamic service capability: Innovation followed by implementation* – to enable dealing with new service demand (*see* Figure 4-10).

Support architecture for organisations and individuals
Static service capability: Framework of standards, processes & systems
Provision of sociotechnical support for existing SQ processes
Monitoring and enforcement of existing SQ processes
Dynamic service capability: Innovation followed by implementation
Innovation of SQ standards and processes
Implementation of SQ process innovations

Figure 4-10: Support structural SQ factors

I-12 summarises the purpose of a *support architecture for organisations and individuals*:

> *"Our mission is to enable, to support the workshop team to do the best [through] people, transparent processes and integrated tools"*

The enabling function refers to both current, i.e. existing service demand and to future, i.e. new service demand.

Static service capability: Framework of standards, processes & systems

I-10 stresses that a solid framework governing technical aspects as well as professional interaction is relevant for the success inter and intra-organisational cooperation:

> *"So, if the book of rules is made very sloppy, or if the adherence to the book and compliance and checking of it is bad, then you are already losing half of it. The other half is when you address or talk to the dealer in the wrong way."*

Provision of sociotechnical support for SQ processes begins with clarifying roles and responsibilities of each stakeholder as I-10 explains:

> *"The most critical thing is to make a dealer understand or make the necessary processes and procedures. To make the dealer understand what the national sales company and the global company, headquarters, is actually talking about."*

On the back of clear structures, service organisations and individuals need to be empowered in different ways as I-2 argues:

> *"You've got to make sure that, one, they have the right training, the right mentorship, the right leadership, you know, all those things need to be in place. And you can't just say to someone, 'here is a turnkey workshop, just put some people in, it'll work'. It won't work. Because it's not about the workshop, it's about the people."*

However, excessive ruling can hamstring service operations as I-9 points out:

> *"Sometimes there is not enough space for all the signatures you need."*

In line with extant literature on service processes (Carlborg & Kindström, 2014), I-4 confirms that systemic complexity causes inefficiencies in the SQ process:

> *"We are making the process too complex. We are putting too much paper in the system. We are checking things that are not broken and we all know that it's not broken but we are still spending time with it."*

I-5 argues that dealerships are unable to follow the SQ because of the existing complexity levels:

> *"I think the biggest problem in our workshop and especially when it comes to the administrative side, is time management due to the complexity of the system."*

On the contrary, I-13 views individual capability instead of system complexity as core factors determining SQ process effectiveness:

> *"I don't think the current Dealer Management System (DMS) is complex to be honest. The biggest challenge is the quality of the service advisor."*

His statement resonates well with a large-scale study on service firms which identified service employee capabilities as the key factor explaining differences in SQ effectiveness (Jayaram & Xu, 2016).

In conclusion, there is consensus amongst the informants on the necessity of governance mechanisms but dissent on their shape and reach because of conflicting interpretations of reasonable complexity levels.

This is not too surprising because the architects and managers of support structures often only have theoretical backgrounds, as I-10 explains:

> *"The problem with national company and headquarters is that they are not very familiar, in many instances, with processes and procedures and the real-life procedures of a dealership. Many people on headquarters and national sales company level have actually never served on dealership level."*

Further, the views on the right approach and extent of *Monitoring and enforcement of existing SQ process*es reflect the divergent conceptions of the respondents:

On the one hand, I-8 emphasises the importance of quantitative measures:

> *“It is really helpful to implement some KPIs and some monitoring tools in the workshop. [...] And this is one thing, especially in our industry, if you show risk potential or if you show money that you can easily earn or maybe you lose, then you have the owner on your side.”*

On the other hand, I-10 argues that quantitative performance monitoring is incomplete:

> *“Many of the companies today manage their infrastructure only by figures … figures tell a story, but figures do not tell the story behind the story.”*

Similar to criticism of the extent of process governance mechanisms, I-2 is of the opinion that SQ process controls are excessive

> *“Head office is sort of controlling, over controlling the situation.”*

Instead of maintaining a command-and-control structure, I-4 favours a stronger collaboration between wholesale and retail organisations:

> *“"It's got to be a partnership between OEM and the dealer because if you haven't got a backup from the OEM the dealer is not gonna iron it on its own. [...]*
>
> *That's South Africa now, they wonna see people and it's the after sales that helps sell the future vehicles because if we don't get it right on the after sales side, the sales side will have a problem going forward because it takes away all the leverage, all the ammunition, even if they have the best product it means nothing."*

Dynamic service capability: Innovation followed by implementation

The second leg of the support architecture refers to *Dynamic service capability*, which empowers organisations and individuals to deal with new service demand. *Innovation of SQ standards and processes*, designed to help master emerging service requirements, must follow a balanced approach with regards to customisation, as I-8 explains:

> *"We try to make it as easy as possible but there is no one size fits it all."*

Innovation in the SQ process context has to address technical as well as social dimensions, he argues:

> *"We have tons and tons of data. We have to analyse, and we have to discuss with our customers how this data can help us work together. But in the case some things goes wrong, or when the customer wants to talk to us, if there is a human person pick up the phone, I think this is from customer side, especially in this digital world, you can say, hey, I'm still a human and whatever you have, I'm still there for you."*

When providing *implementation support for new SQ process standards*, individuals and organisations must not be overwhelmed. Therefore, new components have to be integrated into existing, i.e. known frameworks, as I-7 explains:

> *"So, we try to put these new tools in parts they know."*

In fact, Hensley and Dobie (2005) recommend to evaluate the organisational readiness based on previous experience and knowledge of existing processes prior to the implementation of SQ process innovations. I-7 explains:

> *"You have to check which competencies are good, which competencies are not so good and which competencies we have to train. And then we have to find the right training for these persons to get to this level we need."*

However, qualitative and quantitative factors play equally vital roles in realising organisational change (Al-Haddad & Kotnour, 2015). Accordingly, I-8 argues that every new SQ process has to be accompanied by a clear value proposition:

> *"A business case, which shows you anyway that you can save money, or earn more money but what we do in addition, we brought with all those actions in the customer satisfaction index."*

I-11 confirms that service organisations need to be assured a positive return on investment in the change of processes, which involves staff recruitment and development:

> *"They need the proof that that employing a person with a technical background as a service advisor is worth the money."*

I-10 argues that investment in skilled service employees is likely to be profitable:

> *"If [dealerships] hired highly skilled people, they should not be running at a loss."*

However, this view is not shared by everyone, as the statement of I-3 portrays:

> *"I do find the training is very extensive. In other words, it can be for up to a week, keeping the guys out of the workshop. You have to have training, but I do feel, it must come down to 2 to 3 days jobs because it just hits our productivity big time."*

These statements show that the benefits of investment in trainings are at least debatable. Mixed conclusions can also be found in the literature. In a longitudinal, cross-sectoral study on the return on investment in training Percival *et al.* (2013) found out that generally training improves the productivity but not necessarily the financial performance of firms. Against the backgrounds of technological changes and staff turnover, training is paramount to preserve productivity levels and, in the longer term, the firm. Jones *et al.* (2016) have shown that workplace coaching, i.e. a personalised form of training, is highly effective in terms of learning as well as financial outcomes. In consequence, a tailored approach as to training mode and content based on the needs of organisations and individuals appears to be useful. Along these lines, I-13 recommends a stronger balance between technical and administrative training offerings.

> *"There is a lot of emphasis going into technical trainings, which I understand, which is essential, crucial, particularly with the vehicle specs coming out. But, what about the administrative side of it, equally as important."*

Organised by stakeholders and service capabilities, this section discussed the main factors as well as interdependencies impacting on SQ process

effectiveness. The elements of the SQ system and their couplings are not to be understood monolithic entities but rather as dynamic processes (Orton & Weick, 1990). Therefore, the following section discusses the creation of an SD model, which encapsulates synthetic, closed-looped and dynamic patterns of evidence and key finding about SQ processes from research phases 1 and 2.

4.4. Development of SD simulation model for sustainable SQ

The purpose of this section is to build, on the basis of the findings, an SD-enabled simulation model to optimise the SQ process within the chosen research context. First, it discusses the model of the SQ system as well as its boundaries encapsulating the core drivers that emerged from the experiential and consultative phases of research. Second, causal dependencies within the system are considered. Third, it examines how different system configurations translate into SQ process effectiveness over time. Figure 4-11 illustrates a conceptual model for sustainable SQ. It shows that continuous, balanced investment in mutually dependent static and dynamic service capabilities lead to sustainable SQ. This basic concepts forms the basis of the SD simulation model depicted in Figure 4-12 as well as the policy options that follow from it.

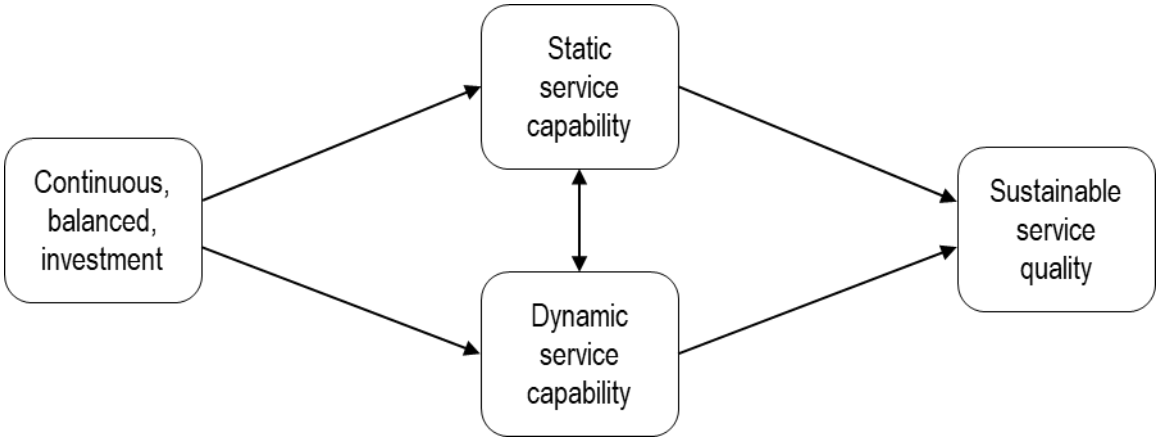


Figure 4-11: Conceptual model for sustainable SQ

4.4.1. Model of the SQ system and its boundaries

SQ process effectiveness is the primary goal of the modelled service system and is determined by the degree to which the service provider can meet customer demand for services (Figure 4-12). There are two types of services. The first type

refers to existing *service transactions,* such as repair and maintenance jobs or breakdowns. The second type refers to *changes* to the existing SQ process, such as new SQ standards, processes and systems. Over time, the initially ‘new’ demand becomes the new norm translated into existing service transactions because SQ process standards change.

The preceding analyses have shown that the main drivers of SQ in commercial vehicle dealerships are service capabilities on the organisational, individual and support structural levels. For the sake of model simplicity and its potential use as boundary object (Spee & Jarzabkowski, 2009), this SD simulation model focuses on the organisational level, but considers individual and support structural levels in its parameterised assumptions. *Static service capabilities* primarily facilitate SQ process *exploitation* to complete *open service transactions*. *Dynamic service capabilities* enable SQ process *exploration* to realise open *process change requests*. The rounded rectangle represents the boundaries of the SQ system, which is composed of two subsystems, i.e. service provider and customer (*see* section 4.2.1).

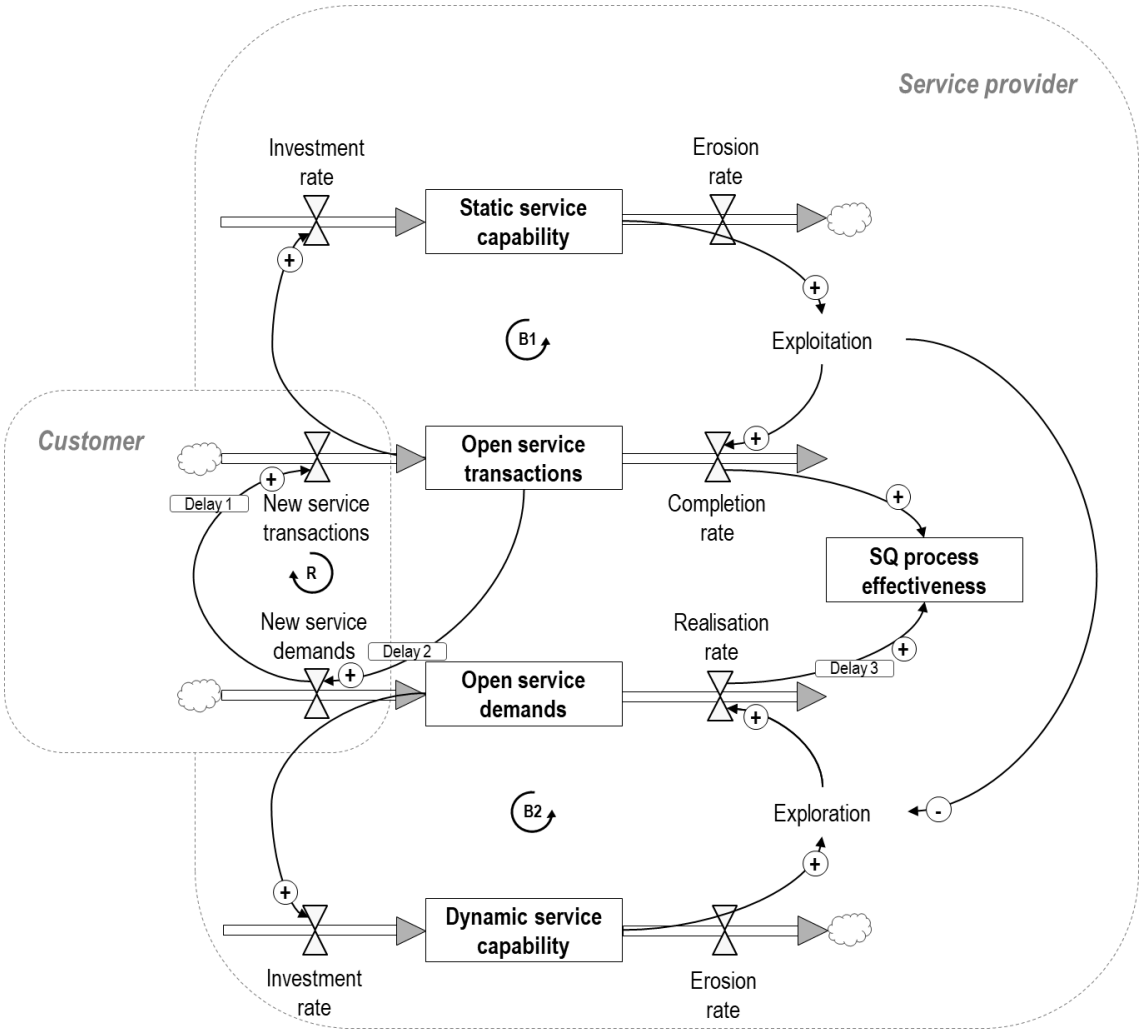


Figure 4-12: SD simulation model for sustainable SQ

Drawing on the system archetype previously discussed (*see* section 2.3.2), the resulting SD simulation model for a sustainable SQ process in South African commercial vehicle dealerships is built around the common trade-off between allocation of resources and time to addressing existing or new service demand (Rahmandad *et al.*, 2009). Awareness of the potential costs and benefits to SQ effectiveness different managerial choices have is of salience, particularly in stressful service contexts where decision-making is often dysfunctional (Starcke & Brand, 2012). Through its clarity, this SD model could have a mediating effect on the process of choice making about resource investments.

This service system model establishes explicit links between the stocks of unfulfilled (transactional) service demand, the stocks of service capabilities and SQ process effectiveness. Table 4-1 provides an overview of descriptions and parameterisation of all SD model elements. The variables and relationships the

model illustrates result from the analysis of the data collected in phases 1 and 2. The parameters were judgementally determined and validated in phase 3.

According to the SD model settings, the initial stock levels are identical, external inflows, i.e. *service transactions* and *new service demands* and outflows, i.e. *erosion rates*, are kept constant. The values of all other variables depend immediately or mediately on policy choices. External sources and sinks indicate the existence of subsystems outside the boundaries of the modelled SD system. As much as these assumptions are simplistic, this makes the impact of different policy choices on SQ process effectiveness clearer – and thus increases the usefulness of the model.

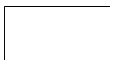
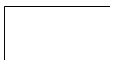
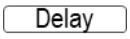
Parameter	Description	Category	Symbol	Value	Unit
Static service capability	Capability to address existing service demand through exploitation	Stock		80	Initial percentage level
Dynamic service capability	Capability to address new service demand through exploration	Stock		50	Initial percentage level
Open service transactions	Workload of repair and maintenance jobs or breakdowns	Stock		50	Initial number of jobs
Open service demands	Workload of modifications of SQ standards, processes and systems	Stock		2	Initial number of service demands
SQ process effectiveness	Degree to which known and unknown service demands are met	Stock		75	Initial percentage level
New service transactions	Valve controlling the flow of new service transactions	Inflow		500	Number per month
Completion rate	Valve controlling the completion of open service transactions	Outflow		Policy-based	Number per month
New service demands	Valve controlling the flow of new service demands	Inflow		5	Number per month
Realisation rate	Valve controlling the realisation of service demands	Outflow		Policy-based	Number per month
Investment rate	Valve controlling the flow of recruitment, training, system upgrades, etc.	Inflow		Policy-based	Percentage level increase per month
Erosion rate	Valve controlling the flow of attrition, technological changes, etc.	Outflow		1	Percentage level decrease per month
Exploitation	Time allocated to SQ process compliance	Variable	Not applicable	Policy-based	Percentage of available time per month
Exploration	Time allocated to SQ process change	Variable	Not applicable	Policy-based	Percentage of available time per month
Delay	Time gap between cause and effect	Variable		3	Number of months
External source	Cloud indicating that source of a flow lies outside the boundaries of the SQ system	Boundary		Not applicable	Not applicable
External sink	Cloud indicating that sink of a flow lies outside the boundaries of the SQ system	Boundary		Not applicable	Not applicable
Balancing loop	Feedback structure that limits the growth of open service transactions or change requests	Feedback loop		Policy-based	Number per month
Reinforcing loop	Feedback structure that reinforces the growth of open service transactions or change requests	Feedback loop		Policy-based	Number per month

Table 4-1: Overview and descriptions of SD model elements

4.4.2. Feedback loops within the SQ process system

There are three feedback loops within the SQ process system model, two balancing loops (B1, B2) and one reinforcing loop (R). B1 limits the number of

open service transactions through investment in and application of static service capability as well as time allocation to exploitation. Similarly, B2 limits the number of open process change requests through investment in and application of dynamic service capability as well as time allocation to exploration. R encapsulates the reinforcement of customer demand. Over time, process change requests are translated into service transactions. Over time, open service transactions lead to an increase of process change request because customers perceive the current SQ process to be ineffective. For the entire SQ process system to be effective the balancing loops have to be stronger than the reinforcing loop.

Groesser & Jovy (2016) argue that there are three types of risk associated both with feedback loops. The limiting effect of balancing loops can also affect desirable growth or decline. The stimulating effect of reinforcing loops can lead to undesirable growth or decline. What is more, factors beyond the system boundaries can worsen impact of internal feedback loops. In the context of commercial vehicle dealerships, an external risk factor is the launch of a new vehicle model that requires service operators to provide and master advanced diagnostic hardware and software system. Once these new models of vehicles enter a workshop for maintenance or repair work, dealers have to the be ready or face an increasing list of customer backorders. Over time, the latter creates dissatisfied customer who request the current SQ process to be changed as it is perceived to be ineffective.

Two major conclusions can be drawn with regards to feedback loops. First, it is crucial for service managers to be aware of undesired consequences and to understand what causes them. Second, they need to know which decisions they can take to improve SQ process effectiveness of their service operations.

4.4.3. SQ process effectiveness over time

The following subsections discuss three distinct policy choices and the resulting simulations of SQ process effectiveness over a period of 36 months, i.e. long-term (Nielsen & Nielsen, 2015). The initial level for the simulations of SQ process effectiveness is derived from average levels reached after an SQ intervention (*see* section 4.2.2). The simulated behaviour over time is based on the SD

simulation model discussed in section 4.2.1.. Adopting a continuous view, the simulations seek to make transparent the dynamics patterns within the system (Groesser & Jovy, 2016). Arguably, an intimate understanding of such systemic patters is essential to setting policies, which leverage the full potential of the SQ process system (Warren, 2005).

The three policy choices pertain to distinct investments of a dealership in static or dynamic service capabilities and time allocations to exploitation or exploration. As much as policies are based on numerical values, they should not be used in an absolute sense but rather as plausible assumptions to explain behavioural patterns of the SQ system. All other flows and delays listed in Table 4-1 are deliberately kept constant to show likely effects of different policy choices.

Policy choice 1: Work hard

According to this policy, service managers allocate 100% of the available time to the exploitation of the current SQ process with 1% investment in static capability enough to maintain the initial level. No time is allocated to the exploration of changes to the current SQ process with no investment in dynamic capability.

Figure 4-13: Policy option 1: Work hard

Figure 4-13 shows that the initial SQ process effectiveness level increases but only for a very short period of time. Thereafter, the erosion rate of static capability decreases the completion rate of open service orders despite 100% of time allocation to exploitation. Further, the erosion rate of dynamic capability

decreases the realisation rate of open process change requests, which also negatively affects SQ process effectiveness. What is more, the reinforcing feedback loop increases the number of open service transaction from period 3 onwards. After around 5 months, SQ process effectiveness level further decreases but at lower rates of change. The latest at this stage, intense managerial intervention such as overtime or temporary deployment of skilled personnel to ensure that a basic SQ level can be reinstated at the dealership.

The key conclusion from the analysis of the scenario ‘work hard’ is that it is insufficient to exclusively focus on exploitation of the current SQ process without developing static capability as it leads to a rapid dramatic of SQ process effectiveness within relatively short time span.

Policy option 2: Work smart

According to this policy, service managers allocate 80% of the available time to the exploitation of the current SQ process with 2% investment in static capability. 20% of the available time is allocated to the exploration of changes to the current SQ process with 2% investment in dynamic capability to increase the initial level.

Figure 4-14: Policy option 2: Work smart

Unlike policy option 1, Figure 4-14 shows that the initial SQ process effectiveness level decreases initially to about 60% by month 6. Thereafter, the increase in service capabilities – both static and dynamic – translate into higher completion rates and ultimately similar SQ process effectiveness level as at the beginning.

The problem with this scenario becomes obvious when considering a relatively flat improvement curve.

The key conclusion from the analysis of the scenario ‘work smart’ is that the increased investment in service capabilities and exploration are effective only to the point that they prevent decline. An alternative, more effective policy choice is therefore highly advisable.

Policy option 3: Work smarter

According to this policy, service managers made the same investment in static and dynamic capabilities as in the previous scenario but allocate twice as much time to exploration. Like the previous scenario, SQ process effectiveness initial drops but in the ‘working smarter’ scenario the ramp-up phase is significantly shorter. Figure 4-15 illustrates the worse-before-better behaviour, which is widely discussed in the literature (Größler *et al.*, 2008; Kunc, 2018; Ramager & Shipp, 2009).

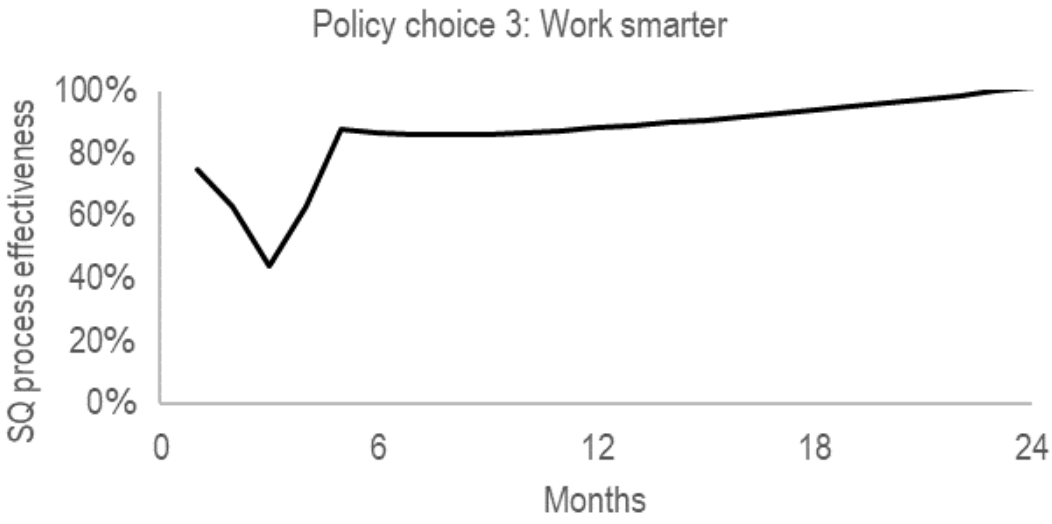


Figure 4-15: Policy option 3: Work smarter

The key conclusion from the analysis of the scenario ‘work smarter’ is that service managers should, firstly, ensure a sound allocation of available time to the exploration of new service demand and, secondly, guarantee an investment in both static and dynamic service capabilities that is greater than its erosion rate. This scenario emphasises the importance of practicing new processes and consciously applying knowledge acquired in training interventions.

Finding the right policy mix

The preceding analysis unpacked the complexity and resulting challenges of a sustainable SQ process resulting in an SD model, which was used to simulate the effect of three policy options. Arguably the best solution to the SQ problem is a pronounced investment in DSC and time allocation to exploration. Such choices have to be made sensibly considering the specific, situational constraints of an organisation. Therefore, without integrating policy choices into organisational routines, there are little changes of SD projects to move beyond the identification of solutions towards sustainable change of organisations (Größler, 2007). The remaining and arguably the biggest challenge is to find effective means to implement these results.

4.5. SD model validation and ways of operationalisation

The purpose of this section is to validate the simulation model in consultation with a key informant and to develop an operational framework to effectively translate it into practice as a means to achieving sustainable SQ.

In line with the design of the SD simulation model, the type of organisational change envisioned to improve SQ is primarily continuous and partially planned due to constant flows but also emergent due to feedback structures within the system (Todnem, 2005). Hence, Sackmann *et al.* (2009) advocate a systemic approach to enable and sustain change in organisations.

A key informant validated the plausibility and usefulness of the findings accumulated during the longitudinal study. Overall, the conclusions drawn regarding the SQ process, the embedding context and its system change behaviour were considered credible and, under certain circumstances, of practical use for sustainable SQ through the creation of a learning organisation as pointed out by the key informant.

The key informant commented on findings originating from each phase of research. With regards to the service system supporting the SQ process – discussed in phase 1 – he highlights the challenge of coordinating the flow of technical and commercial information in a triangular relationship between service

advisor on the service provider side, and vehicle owner and driver on the customer side. This challenge only reinforces the importance of service capabilities on individual level. Concerning sensing and seizing opportunities – discussed in phase 2 – he argues that knowledge of customer needs not only affects the development of new types of services but also their pricing. This recognition is in line with the previously conferred concept of service value. For the SD model – discussed in phase 3 – to be operationalised, the key informant recommends a thorough evaluation of current organisational capabilities, similar to the concept of organisational readiness (Heckmann *et al.*, 2016; Hensley & Dobie, 2005; Sackmann *et al.*, 2009). Further, an operational framework should include costs related to investments as well as to timelines to show their effect on SQ to service managers. These recommendations are in line with the concept of a process-oriented intervention architecture as a guiding framework, which is based on the dimensions ‘time, space, social and content’ (Zock, 2004). Such an approach helps to institutionalize the SD process and to increase its impact (Größler, 2007).

CHAPTER FIVE CONCLUSIONS

5.1. Introduction

The purpose of this chapter is to discuss the key findings from this research project and to draw conclusions about their contributions to theory and practice leading to an assessment of their implications for further research. The overriding concerns were to ensure alignment between the research objectives and results in accordance with conventional quality criteria of rigour in qualitative research – generalisability, reliability, and validity – as well as action stimulus to do justice to the pragmatic approach.

This chapter comprises five sections. It begins with an evaluation of the achievement of the research aim and its objectives. The chapter then moves on to discuss the key findings from the literature review and the primary research. The review of extant literature reveals a gap in the application of SD principles to SQ to ensure sustainable policy implementation. Based on the primary research, SQ in commercial vehicle dealerships is a complex sociotechnical process that is underpinned by the systemic interaction of social and physical elements of service operations and their customer. Organisational size of service operators is associated with implementation speed of SQ measures but not with magnitude of SQ improvement. Small dealerships are faster at adjusting to modifications of the SQ process in the short run. Simulations of different SQ policy choices show that sustainable SQ is dependent on continuous efforts to maintain and develop static and dynamics service capabilities. A structure and component for an operational framework are derived integrating SD principles and the basic process of quality improvements. The chapter proceeds to discuss how the findings contribute to the body of knowledge in terms of theory and practice before discussing their limitations. The chapter concludes with a consideration of implications for further research.

5.2. Achievement of research aim and objectives

The aim of the study was to develop a practical framework rooted in the principles of SD to achieve sustainable SQ within the specific context of South African commercial vehicle dealerships. It was broken down into five objectives, which are listed in Table 5-1 along with corresponding results and their implications.

These objectives were achieved through a structured research process, which was split into two successive stages of deduction and induction. The deductive stage referred to the thematic review of the literature leading to the development of a conceptual framework to inform the empirical work. The inductive stage was concerned with collection and analysis of primary data. The process was geared to the incremental creation of knowledge with practical implications. Consequently, the research was conducted from a pragmatic stance (Metcalfe, 2008), which implied that the ultimate purpose of this research was to improve practice (Resnik, 2000). This approach strongly influenced the design of this research (*see* Figure 3-1), which was case-based, predominantly qualitative and action-oriented combining a range of mixed data collection and analytical techniques to allow for a longitudinal, complex and in-depth analysis of the main unit of analysis – the SQ process across a sample of commercial vehicle dealerships in South Africa (Yin, 2013).

Research objectives	Research results	Implications
(1) To conduct a critical review of relevant streams of literature to establish an explicit link between the notions of service quality (SQ) and system dynamics (SD), leading to the development of a conceptual framework that informs the primary research.	An extensive review of more than 300 sources ranging from peer-reviewed journal articles, management magazine articles to books led to ▪ the identification of research gaps concerning effective ways to improve complex SQ systems through the application of SD; and resulted in ▪ the development of a conceptual framework focusing on SQ and SD and how their interplay can lead to sustainable SQ.	SQ systems need to be examined systematically to better grasp their complexity in terms of key components, interaction and dynamic behaviour. A systemic understanding is a prerequisite of sustainable improvement.
(2) To gain an in-depth understanding of the nature of the current SQ process across a sample of commercial vehicle dealerships in South Africa.	More than 80 interventions were performed across 25 case dealerships over the period of 18 months embracing participant observations and audits of the SQ process. ▪ The SQ process results from the complex interaction of sociotechnical service system components which leads to dynamic behaviour over time. ▪ A significant difference between small and large dealerships could be found with regards to rates of change. Small company tended to improve faster. No difference could be found in post-intervention SQ effectiveness.	The complexity of sociotechnical service systems increases with size and reduces the rate of change. Though, in the long run, issues other than organisational size influence the effectiveness of SQ.
(3) To examine the contextual factors impacting the SQ process using the key principles of SD as an investigative lens.	Contextual factors emerged from the analysis of 13 semi-structured interviews with SQ experts with diverse organisational perspectives and were organised according to two dimensions: ▪ Stakeholders: Organisation, individual, support structure; ▪ Service capabilities: Static and dynamic.	SQ reflects two sets of abilities. Service systems must be able to address immediate, transactional service requirements by exploiting the existing SQ process. They also need to respond to emerging demand by exploring ways to change the SQ process.
(4) To build, on the basis of the findings, an SD-enabled simulation model to optimise the SQ process within the chosen research context.	An SD simulation model was built using static and dynamic service capabilities as the main resource driving SQ. ▪ The model comprised the main drivers and feedback structures of the SQ system. ▪ Three distinct policy choices were simulated to illustrate their impact on SQ process effectiveness.	Sustainable SQ depends on modest, continuous investment in capability maintenance and development and significant time allocation to exploring ways to change the SQ process.
(5) To validate the simulation model in consultation with a key informant and to develop an operational framework to effectively translate it into practice as a means to achieving sustainable SQ.	A workshop was conducted with a key informant. ▪ The findings as well as the simulation model were considered plausible representations of the structure and dynamics of the real system. ▪ Several recommendations for the operationalisation of the SD model were made.	As much as the principles of continuous and considerable efforts apply, policies have to fit to specific, organisational settings – a requirement an operational framework has to address.

Table 5-1: Research objectives, corresponding results and their implications

5.3. Summary of key findings

Chapter 2 and Chapter 4 addressed in detail the five objectives of this research. Following a discussion about the gap in the current literature which demarcates

the research scope, the following subsections provide concise discussions of the key findings and their implications. They followed a pragmatist philosophy, which mandated that research findings had to be assessed against common quality criteria of rigour in qualitative research – generalisability, reliability, and validity – as well as against action stimulus. Generalisability of findings refers to the quality of conclusions being applicable to populations beyond the sampled cases (Widdowson, 2011). Reliability of findings refers to the accuracy of conclusions, i.e. to their rate of error (Brühl & Buch, 2006). Validity of findings is reached through a suitable design, legitimate processes and consistent interpretation (Dellinger & Leech, 2007). Action stimulus is concerned with the practical implications of findings (Reason, 2003).

5.3.1. Principles of SD in the context of SQ – a theory-application gap

The thematic review of extant literature on SQ revealed that despite its strategic relevance particularly to service organisations, initiatives to improve SQ often make no lasting impact because the dynamic complexity of sociotechnical service systems is generally underestimated by management. The modelling and simulation methodology SD could address this challenge through an exploratory process, which incorporates the complexity, feedback structures and dynamics of these systems. Little is known, however, about how SD should be applied to SQ to ensure sustainable policy implementation (Größler, 2007). A potential reason for this situation is that action-oriented research, which is required in such a field, is extremely time-consuming and resource-intensive (Saunders *et al.*, 2008). However, to derive theories for action, further research has to concentrate on the studying the application of the concepts of SQ and SD to practical contexts (Checkland, 2012).

The outcomes of the literature review were synthesised in a conceptual framework that organised key themes in a cycle of application, effect and evaluation. The application of the principles of SD to SQ is followed by a consideration of its potential effect on the overall service system. In line with pragmatism as well as the idea of continuous and sustainable change (Sackmann *et al.*, 2009), both application and effect are subjected to constant evaluation, which forms the basis for change (*see* Figure 2-11). This framework provided guidance for the empirical work, an investigation from a longitudinal perspective

of how complex SQ systems can be understood and improved through the application of the principles of SD.

5.3.2. SQ as a complex sociotechnical process

The first of three phases analysed the SQ process in 25 commercial vehicle dealerships in South Africa over a period of 18 months and revealed that SQ is underpinned by complex interactions of components within sociotechnical service systems, which comprise the customer and the service provider with its support structures.

The examination of the SQ process showed that when undergoing change initiatives, the case organisations adjusted their behaviour at different rates of change. One important finding is that small dealerships tended to implement SQ process improvement measures faster than large ones. This is not too surprising because small service organisations operate in environments, which prompt them to regularly adjust their resources in order respond swiftly to changing customer needs and have less complex structures which accelerates decision-making processes (Goldschmidt & Chung, 2001). Therefore, agile mindsets and experiences diffuse more quickly in such organisations (Kalenda *et al.*, 2018) which increases the rate of change. However, after the completion of change measures the final SQ levels were comparable in both groups of service organisations. Therefore, another important finding is that the *speed* of change differs, but not its *magnitude* (Burnes, 2004).

These findings are primarily applicable to South African commercial vehicle dealerships – irrespective of brand – for two reasons. First, on the service provider side, employees regularly change companies within the same sector which leads to a dispersion of SQ routines and standards. Second, on the customer side, particularly larger accounts operate mixed fleets, i.e. vehicle of different brands, which translate into similar SQ process requirements. Of course, there are also operations that provide services in specialised circumstances, e.g. in mining locations or for municipal transport companies and therefore work according to slightly different SQ processes.

With caution, these findings are generalisable to dealership operations in other countries and industries that face similar challenges in terms of service demand

and service capability because the complexity associated with such sociotechnical systems also applies to service settings elsewhere. Correspondingly, the findings could even be relevant to service operations in other emerging markets or other industrial goods sectors, such as construction or agricultural machinery because uptime is of equal importance in these sectors. Specifically, with respect to process dynamics, the findings mirror results reported in the literature about other change initiatives outside the industry studied in this research.

These findings are reliable because they follow from consistently repeated applications of standardised data collection methods and tools in more than 80 interventions across 25 case organisations. The large number of SQ process items ensured robustness of the audit approach since diverging views on individual checks could not distort the overall picture.

Validity of findings from the experiential phase was achieved by analysing multiple participant observations and audits across a multitude of organisations across South Africa over an expanded period using a systematic and transparent protocol of inquiry (Yin, 2013). Thus, this rich pool of quantitative and qualitative data enabled robust evidence about components and relationships of the sociotechnical SQ system.

These findings promote action because they can initiate a problem-resolution process that begins with a systemic understanding of the SQ problem within its organisational context, is followed by defining a SQ goal for the sociotechnical system and is lastly concerned with the practical application of SQ improvement measures (Walker & Cox, 2006).

5.3.3. Contextual factors impacting the SQ process

The examination of contextual factors that impact on the SQ process revealed that sociotechnical service systems required two sets of – static and dynamic – service capabilities on different organisational levels involving organisations, individuals and support structures (*see* Figure 4-7). On the one hand, they must be able to address immediate, transactional service requirements – which in this research context means planned or unplanned maintenance and repair jobs – by exploiting the existing SQ process. Here, service organisations need to provide

a framework that contains cultural, procedural and infrastructural elements geared to operational excellence. Individuals have to be able to follow processes that are largely defined. A support architecture facilitates and encourages operational excellence and process compliance through a framework of standards, processes & systems. Process improvement methodologies such as lean six sigma have the potential to reduce waste and errors, thus making the SQ process more efficient and stable (Laureani *et al.*, 2010). Static service capabilities represent the backbone of commercial vehicle dealerships because they ensure ***today's*** income by providing services according to the current SQ process.

On the other hand, sociotechnical service systems are continuously confronted with emerging customer demand that requires changes to the existing SQ process. Through a process of exploration, organisations should be able to sense and seize the opportunities associated with this new demand. Service employees have to know their customers as well as their businesses in order to recognise and grasp such opportunities because even the most radical innovations of service processes are grounded in a good understanding of actual and potential customer needs (Johansson *et al.*, 2019). A support architecture needs to invest resources in the design and implementation of changes to the SQ process because the potential for – technological or non-technological – service process innovations is very high (Trigo, 2013). Dynamic service capabilities are crucial to sustainable service operations because they safeguard ***tomorrow's*** income by searching and seizing emerging opportunities to improve the SQ process.

These conclusions can be extended carefully to sociotechnical service systems in similar sectors and markets because the basic structure – individual, organisation and support architecture – could serve as an initial lens for system analysis. Judged by their prominence in the management literature (*see e.g.* Teece *et al.*, 2016), the concepts of static and dynamic capabilities as levers for effectiveness appear to be relevant – to different degrees – to any organisation exposed to 'volatility, uncertainty, complexity, and ambiguity' irrespective of sector, size or country (Schoemaker *et al.*, 2018).

The data generated during phase 2 is grounded in theoretical concepts and empirical evidence. 13 semi-structured, transcribed interviews with informants

with diverse perspectives and backgrounds were subjected to an iterative coding process. The resulting codes and sub-codes contributed to a rich pool of perspectives, which were logically arranged by themes that emerged from the literature review as well as from phase 1. This approach enhanced the reliability and validity of the conclusions about contextual forces underpinning the SQ process.

The findings are a stimulus to action because they disclose, describe and organise the forces underpinning the SQ process system. As such, they provide structure to the SQ problem (Eden, 1994) and greater clarity pertaining to system-based measures to address it (Smith, 1988).

5.3.4. SD-enabled simulation model to optimise the SQ process

Informed by the findings of the preceding research phases, namely that static and dynamic service capabilities on different levels are the main drivers of SQ, an SD-enabled simulation model was built to optimise the SQ process within the chosen research context (*see* Figure 4-12). The model comprises the main components and feedback structures inherent to the sociotechnical SQ system and considers that service capabilities can not only be created but also lost over time (Rahmandad & Repenning, 2016). Simulation of three distinct policy choices concerning the development of service capabilities (‘Work hard’; ‘Work smart’; ‘Work smarter’) were presented to demonstrate their impact on SQ process effectiveness in the long run. According to this model, sustainable SQ in commercial vehicle dealerships depends on modest, continuous investment in static and dynamic service capability as well as on significant time allocation to SQ process maintenance and development (Policy choice ‘Work smarter’). This finding represents a departure from the idea of transformation based on bold, once-off SQ initiatives and calls for an incremental, constant approach to change (Repenning *et al.*, 2017). The distinction between monetary and temporal investment was made because service employees in dealerships need not only new SQ process tools and trainings but also the time to put these innovations into practice within their specific contexts – stressing the dynamic nature of SQ improvements (Repenning, 2002).

Derived from the system archetype ‘shifting the burden’ (Atwater *et al.*, 2008), the SD simulation model was based on abstracted service demand and supply components that were distilled from the previous research phases and which affect SQ process effectiveness. The basic model structure is arguably applicable to various service operations and its parameterisation can be adjusted to different contexts. The simulated behavioural patterns resulting from different policy choices about resource allocations to address a combination of operational and strategic customer needs can, within limits, be extended to other service systems with comparable service demand patterns.

During phase 3, a key concern was that the structure of the SD model represented credibly the main elements of the SQ system and that the policy-based simulations reflected plausibly the systemic behaviour over time. The model structure was developed in an iterative process during which different sources of evidence from preceding research phases and the literature were triangulated. The result was presented to and validated by a key informant. Further, the presented behaviour over time charts were the result of cycles of simulations leading to the calibration of the model structure and setting until a satisfying state was reached.

During the modelling phase, validity was achieved by iteratively revising the model structure – i.e. the arrangement and content of stocks, flows, feedback loops and delays – to reflect the purpose of the model, which was to understand how static and dynamic service capabilities influence SQ process effectiveness in order to inform policy choices. During the simulation phase, the researcher performed several calibrations, first on his own and, later, in collaboration with a key informant until agreement was reached on the behavioural pattens the SD model produced (Sterman, 2002).

These findings on policies clearly encourage action because they assist decision-makers in the process of understanding the nature of SQ and of formulating appropriate measures to improve it. Größler *et al.* (2008) argue that SD models and simulations are of particular value in the context of service operations where stocks, flows, feedback loops and delays are common phenomena that are either disregarded or insufficiently taken into consideration.

5.3.5. Basic structure and components of an operational framework

The findings made apparent the necessity for the systematic coordination of policy implementations in order to move a service organisation towards the desired SQ levels in the longer term. Some basic requirements for the operationalisation of SD policy recommendations are paramount against the background of skyrocketing failure rates and dozens of 'critical failure factors' (Decker *et al.*, 2012). Walker and Cox (2006) list three basic, sequential questions to effectively address complex problems such as SQ: "(1) What to change? (2) To what to change? (3) How to implement change?" (*ibid.*, p. 139). The first question addresses the change level – organisation, individual, or support architecture – and the change subject – static capability, dynamic capability. The second question speaks to SQ effectiveness as a goal of sociotechnical service systems. The third question refers to a plan of action that considers resource commitments, agentive roles, cost implications, intended benefits and timelines. Most importantly and in line with the developed SD model as well as theories of change management of sociotechnical systems (Pasmore *et al.*, 2019), change has to be continuous. The basic structure and components of an operational framework discussed above integrates the principles of SD and is aligned to basic processes of quality improvements. Recommendations for the application of the operational framework will be presented in chapter 6.

5.4. Contribution of study

The preceding discussions of the achievements of the aim and objectives of this research as well as its key findings provided a basis for the assessment of the contribution of this research project. Arguably the overarching contribution of this thesis was its account of a longitudinal SD engagement with the complex reality of SQ in the challenging environment of South African commercial vehicle dealerships (Checkland, 2012).

As part of a professional doctorate programme, this DBA thesis makes a contribution to practice, knowledge and by extension to the enhancement of 'professional practice' (Farrell *et al.*, 2018, p. 372). The contributions of this thesis are linked to its cumulative findings and discussed in the following sub-sections.

5.4.1. Contribution to practice

This research contributes to practices in several ways. The SQ process analysis using a theory-grounded service system framework offers a useful structure to explain the relative importance of each system component. The sociotechnical model gives insights into the systemic complexity of commercial vehicle dealerships, which is relevant information for service managers who need to coordinate operations. The conclusion that the complexity of sociotechnical service systems increases with size and reduces the rate of change but not long-term SQ process effectiveness helps managers be clearer about their change expectations. The presentation of static and dynamic service capabilities as the main levers of sustainable SQ is a useful classification as it helps service managers to spot and address systemic constraints (Naor & Coman, 2017).

The SD simulation model represents a contribution to practice because it encapsulates the core structure of the service system underpinning the SQ process in commercial vehicle dealerships in South Africa and beyond. It gives insights into the main resources and relationships of the service system and makes explicit that SQ effectiveness depends on the capability to address adequately both short-term service demand and strategic changes in a balanced way. This can help service managers to reduce the amount of resources spent on fixing problems, which should not have occurred initially. Further, the SD model shows that not only investment in service capabilities but also allocation of time to practice capabilities is essential. This could convince decision-makers to explore alternatives to traditional classroom training a way to develop skills, such as continuous ‘workplace coaching’ (Jones *et al.*, 2016). Besides working on regular service transactions, service employee could be given the time and responsibility to creative work on practical solutions that satisfy or even delight customers (Lam *et al.*, 2004)

The model can be used by service managers on different levels as a structural lens to explore and to discuss SQ process challenges and to devise adequate policies. In doing so, it stimulates systems thinking – with its key tenets synthesis, dynamics, closed-loops – amongst practitioner who might otherwise remain in linear, reductionist modes of thinking (Houghton, 2008). The diagrammatic representation of the service system invites practitioners to make more informed

inferences about the SQ process effectiveness that sequential process flows could (Larkin & Simon, 1987). The simulations of system responses to different policy choices provide important insights into long-term implications some which might be ignored or at least not intuitively perceived by decision-makers (Torres *et al.*, 2017). They also advocate incremental investment in capability maintenance and development as opposed to erratic, short-term initiatives and therefore raise awareness amongst service managers for potential waste in the form of over- or underinvestment. Ultimately – and arguably most importantly – the serious engagement with the SD model promotes learning about the dynamic complexity of sociotechnical service systems (Kim & Senge, 1994).

5.4.2. Contribution to knowledge

This study responds to a call for research on practical frameworks to enhance the effectiveness of SQ (Prakasha & Mohanty, 2013), a widely utilised concept that was adapted to fit a range of specific industries as a useful measurement mechanism (Ladhari, 2009). Albeit, frequent failures of SQ initiatives (Benedettini *et al.*, 2015; Decker *et al.*, 2012) make a closer examination of its causes necessary and valuable (Cândido & Santos, 2015). Consequently, the focus of this research was to contribute to the body of knowledge about the drivers of sustainable improvement, employing the concept of SQ as the primarily goal of a sociotechnical service system (Pasmore *et al.*, 2019). In doing so, it contributes to the body of knowledge by adding to the empirical SQ literature.

The research project is innovative primarily thanks to its design and to the context in which it is undertaken. The pragmatic research design (*see* Figure 3-1) essentially models a process for conducting case-based, longitudinal field research that combines different methods of data collection, analysis and validation. Through its inclusion of SD it raises awareness for an underutilised yet useful instrument (Ackoff, 2006) for in-depth process systems explorations (Wang *et al.*, 2017).

Academic research on SQ in the context of commercial vehicle dealerships is relatively rare because most studies on SQ in the automotive industry focus the passenger car segment. To the knowledge of the researcher, there is no comparable study on this topic in the South Africa context.

5.5. Limitations

Results that are based on case-related, qualitative research lead to conclusions that are only generalisable with caution. Although the model was built based on interpretations of rich data collected in multiple case organisation and selected experts in South Africa and Germany, it originates from a single brand in a specific sector. Consequently, transferring the findings to other brands, sectors and countries may only be done carefully.

Studying SQ in the South African context is certainly unique but its findings could also be relevant to other, similar makes and industries. On the one hand, the economy of this country suffers from fundamental problems, such as significant skills shortage, infrastructural challenges and uncertain macroeconomic outlook, similar to numerous so-called emerging economies. On the other hand, it is exposed to advanced customer requirements such as digital services, similar to advanced economies. Against this background, an emphasis was placed on the development and erosion of static as well as dynamic service capabilities to address such demand in a balanced way. In the bespoke SD model, these were represented by stocks. The SD-enabled operational framework consequently places a focus on service capability and ways to grow it. However, in other economical environments, possibly the structure but certainly the calibration of the SD model would differ. Also, the operational framework would have distinct focal points but could still serve as a useful reference.

5.6. Implications for further research

This theory-building study presents a range of research opportunities to test and extend its findings (Perry, 1998). Quantitative research should consider simulations based on the SD model for sustainable SQ (Figure 4-12) to test its structural validity (Barlas, 1996). Content validity of the SD model should be tested by means of survey and multivariate analytic techniques (*see e.g.* Jayaram & Xu, 2016*)*.

Qualitative case-study research on the operational framework could lead to useful insights into facilitators and inhibitors along the process of policy implementation, adding to the literature on organisational learning and SQ effectiveness (Lee & Lee, 2014). Since this study unpacked the complexity of SQ from the perspective of service provision, future research should integrate in a more pronounced way how customers provide input to the service delivery process (Alzaydi *et al.*, 2018). These investigations would be of great benefit to find out how customers could be integrated more effectively to translate emerging service demand into effective SQ processes. Another fruitful avenue of research of research would be to study the integration of radical digital innovations into SQ process systems (Johansson *et al.*, 2019).

CHAPTER SIX RECOMMENDATIONS

6.1. Introduction

Drawing on the research findings, the purpose of this chapter is to present an operational framework for translating policy recommendations resulting from the SD-enabled simulation model into practice. These recommendations are in line with the key tenets of SD, which had been discussed throughout this thesis, and are informed by the work of Pasmore *et al.* (2019) on change management in the context of sociotechnical systems. The chapter consists of two sections. First, it discusses the foundation and structure of the practical framework before unpacking each of its four sequential core components. Component one focuses on diagnosing service demand, SQ process effectiveness and service capabilities of a service organisation. Component two adopts a systemic approach to design and plan adequate solutions. Component three calls for the institutionalisation of SQ routines to ensure sustainable improvement. Component four proposes regular rounds of evaluation. The last chapter of this thesis ends with some concluding remarks.

6.2. A framework for the practical application of SD to SQ

The operational framework for a sustainable SQ process in commercial vehicle dealerships in South Africa represents a continuous cycle comprising four consecutive phases of mutually reinforcing sets of measures to enhance static and dynamic service capabilities (*see* Figure 6-1). These phases are: (1) Problem articulation & diagnosis; (2) Solution design and action planning; (3) Institutionalisation; and (4) Evaluation. The framework reflects the basic structure of improvement cycles in the quality field (Al-Haddad & Kotnour, 2015) which emerged from Deming's 'Shewhart Cycle for Learning and Improvement' (Deming, 2018) – shown in Figure 2-5 on page 28. As previously argued, SQ process effectiveness is a function of the complex coordination of service capabilities and efforts made by individuals, organisations, and support architectures to address different forms of customer demand. In line with the

concepts of ‘guided change’, which is recommended in contexts of high complexity and technological uncertainty (Buono & Kerber, 2010), this operational framework is a tool to give direction to organisations and to encourage continuous collaboration and learning. It considers three different layers of the sociotechnical service system of commercial vehicle dealerships – organisation, individual, support structure – and links them to aspects of static and dynamic service capability, which emerged from the analyses discussed in sections 4.2 and 4.3.

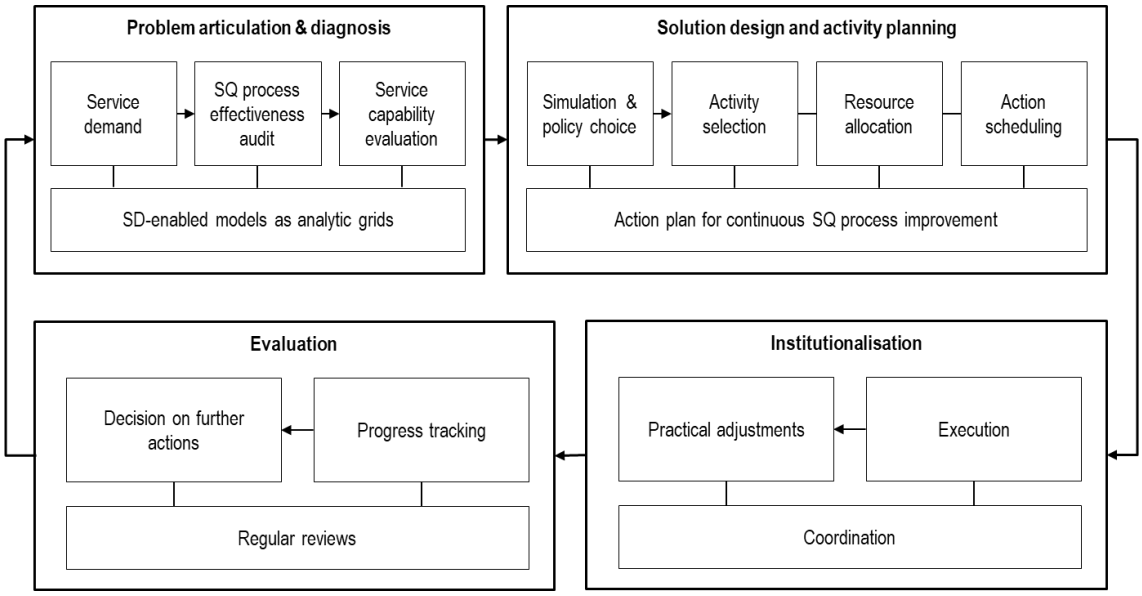


Figure 6-1: An operational framework for sustainable SQ via the application of SD

The first phase is concerned with problem articulation and diagnosis which includes the assessment of the sociotechnical service system in terms of service demand, SQ effectiveness as well as the service capabilities using a set of standardised checklists and structured interviews. The SD model as well as service system and interface models should be used as guides for the analysis. The second phase refers to solution design and action planning and is influenced by the simulations of the effects of different policy choices. The strategy decision needs to be linked to actions that fit to the specific context of a service organisation. Each action needs to be defined and linked to resources and timelines. An action plan for continuous SQ process improvement has to summarise the policy choice with respect to solution design and action planning. Phase 3 concentrates on the institutionalisation of defined activities. During this phase, practical adjustments to the defined measures should be made if necessary. Phase 4 is dedicated to regularly reviewing the implementation status

and to taking decisions on further actions, i.e. to continue as planned or to modify the plan to accommodate practical challenges and opportunities.

As previously discussed, the period after which the improvement actions translate into SQ process effectiveness depends on the actions themselves, i.e. on the investment rate and leverage, but also on flows out of the service system i.e. on the erosion rate (e.g. attrition rate, technological change, etc.). Further, it is influenced by incoming service demand. Regular measurements of the SQ process are crucial. Most importantly, this operational framework supports thoughtful advancement and investment in SQ process change management in South Africa commercial vehicle service organisations (Heckmann *et al.*, 2016).

6.2.1. Problem articulation & diagnosis

The first phase – problem articulation & diagnosis – should provide transparency with regards to service demand, SQ process effectiveness and service capabilities of a service organisation. Along this process the parameters of the SD model should be compiled (*see* Figure 6-2). An external consultant should be assigned by the general manager of a service operation for this activity to reduce bias in assessments. Depending on the size of the dealership, phase one should last between five and ten working days, at the end of which the consultant should present a report, which provides a good assessment of the sociotechnical service system underpinning the SQ process.

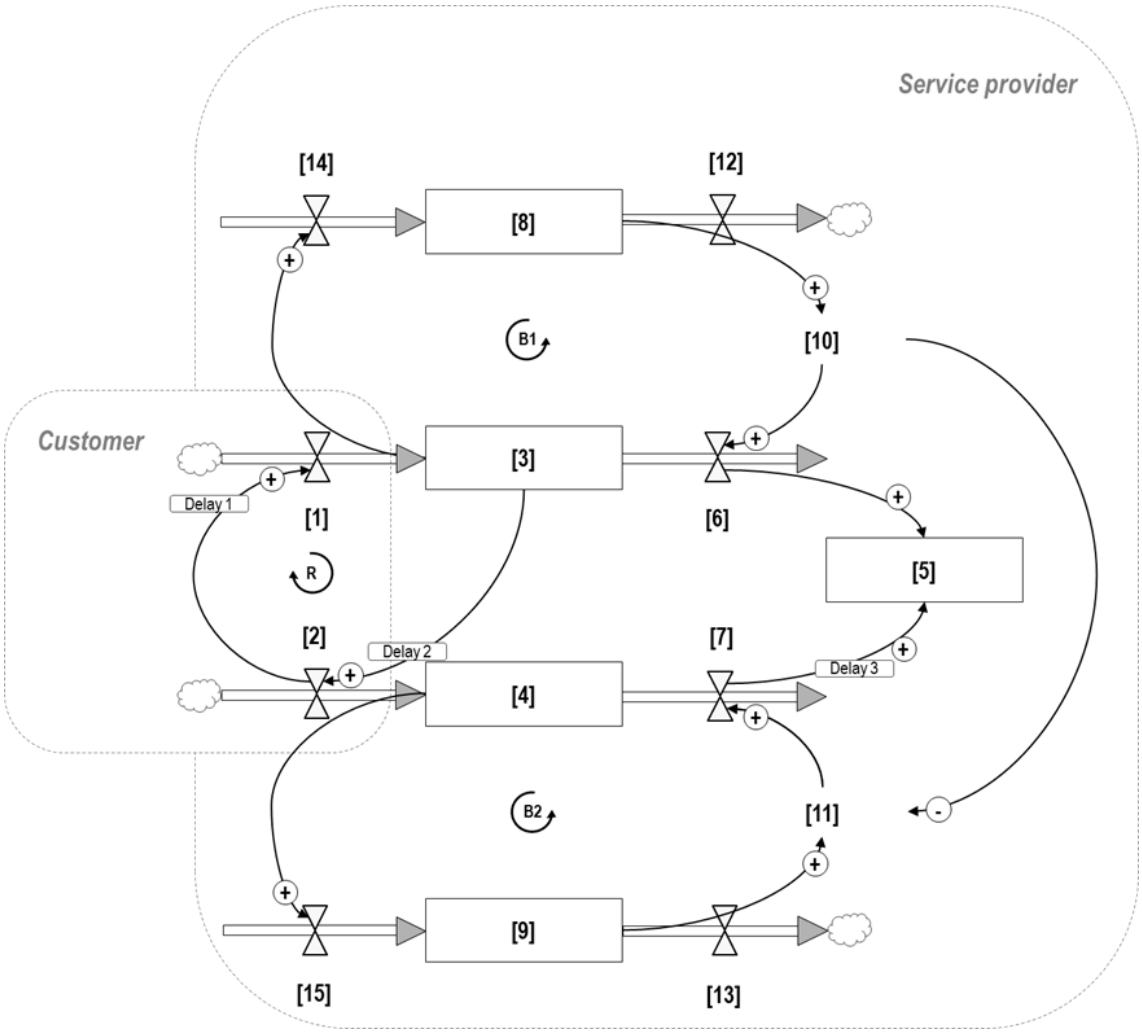


Figure 6-2: Building the SD simulation model, bricks and mortar [1 to 15]

First, they should get an understanding of the types, frequencies and relationships of customer demand [1; 2] and the ability of a dealership to address it using service order reports as well as customer feedback leading to the definition of stocks (of open service transactions [3] and demands [4]) and flows in the SD model. Second, the consultant should evaluate the SQ process in a dealership using standardised audit checklists that cover the steps and interfaces, illustrated by figures Figure 4-1 and Figure 4-2 of CHAPTER Four. The resulting percentage rate represents the initial SQ process effectiveness level [5] for the SD model and is a function of the completion [6] and realisation rates [7]. In a third analytic step, the consultant should rate the static and dynamic service capability levels of each system layer (*see* Table 6-1) based on structured interviews and observations. This activity has two benefits. On the one hand, it helps to identify systematically areas for improvement, which can potentially be addressed using a set of standardised, modularised or customised actions. On the other hand, it forms the basis for quantified ratings, i.e. very low (x <= 25%);

low (25% < x <= 50%); high (50% < x <= 75%); very high (> 75%). The result represents the initial stock levels of static [8] and dynamic [9] capabilities.

					Rating by layer & aspect				Level (%)
	Layer	**Dimension**	**Aspect**		***Very low***	***Low***	***High***	***Very high***	
Static service capability [8]	Organisation	Framework of culture, processes & infrastructure	A	Systemic management perspective					
			B	Operational excellence in dealing with existing service demand					
			C	Professional employee recruitment & development					
	Individual	Process orientation	D	Service-oriented attitude					
			E	Sociotechnical skills to address existing service demand					
	Support architecture	Framework of standards, processes & systems	F	Provision of sociotechnical support for existing SQ processes					
			G	Monitoring and enforcement of existing SQ processes					
Dynamic service capability [9]	Organisation	Flexibility in sensing and seizing opportunities	H	Recognition of emerging service demand					
			I	Fast and flexible allocation of resources to address new service demand					
	Individual	Customer orientation	J	Problem ownership and proactive communication along the resolution process					
			K	Sociotechnical skills to address new service demand					
	Support architecture	Innovation followed by implementation	L	Innovation of SQ standards and processes					
			M	Implementation of SQ process innovations					
[Stock number in SD simulation model]									

Table 6-1: Checklist for the assessment of service capability layers and dimensions

Further, the consultant should record cycle times to process service transactions to get a better understanding of time spent exploiting [10] the current SQ process compared to exploring [11] changes to it. He should then retrieve data on annual staff turnover as well as on process and system changes in order to determine erosion rates for service capabilities [12; 13]. Assuming erosion rates of 1-1.5 percent per month (or 12-18 percent per year) appears reasonable in the South African context, a commercial vehicle market that is characterised by relatively high staff turnover but only modest technological change. The erosion rates give

an indication of the required investment rates [14; 15] for the maintenance and improvement of service capabilities.

Ultimately investments should be made in alignment with the strategic objectives of a service organisation, i.e. the desired level of SQ process effectiveness, its service capability levels and its resources.

6.2.2. Solution design and action planning

The second phase – solution design and action planning – is concerned with making decision on activities that improve SQ process effectiveness using a systemic approach. This phase should take place directly after the presentation of the problem articulation & diagnosis report because phase two requires a solid understanding of the service system.

Together with the service management team, the consultant should use report elements as a basis for parametrisation of the SD simulation and perform policy simulations in Microsoft Excel like the ones presented in section 4.4.3. This process can give insights into behaviour over time and set the ground for fruitful discussions about the investment strategy to be adopted. According to ‘Policy choice 3: Work smarter’, which was previously discussed, investment rates in static and dynamic capabilities should exceed their respective erosion rates to maintain and sustainably improve the SQ process. Also, it mandates that significant time is allocated to the exploration and reflective application of changes as it stimulates learning.

Moderated by the consultant and based on the initial service capability assessment, the service management team should then list and evaluate regular activities to enhance the static and dynamic service capabilities of the dealership. The choice of measures should also be influenced by their respective costs and anticipated benefits.

Table 6-2 proposes a list of ten activities that should be performed on a continuous basis in commercial vehicle dealerships in South Africa. A focus was placed on hands-on actions that are comparably inexpensive and could therefore be integrated in most organisations independent of financial resources. Further, these mutually reinforcing activities emphasise cross-functional, open dialogue,

which encourages learning, and are performed regularly, i.e. from daily to annually, as a way of institutionalisation (Beer, 2003). The list excludes activities that are predominantly performed by support structures, such as the development of new service products and systems. Instead, a specific list item 'Fixed half-day slot for workplace learning' should give service employees the opportunity to learn about and adopt such innovations.

These activities are complementary to project or event-based initiatives and aligned to the key principles of SD, which focuses on organisational routines followed over an extended timeframe.

			Potential benefit												
Routine			***Static service capability***							***Dynamic service capability***					
Description	***Frequency***	***Cost***	A	B	C	D	E	F	G	H	I	J	K	L	M
Manager-subordinate and peer coaching	Daily	+		X	X	X	X					X	X		
SQ system meeting – Focus on operations	Weekly	+	X			X			X	X	X				
Customer liaison meetings and courtesy calls	Weekly	++				X				X	X				
Fixed half-day slot for workplace learning	Weekly	++		X	X			X						X	X
SQ process audit	Quarterly	++	X	X		X		X	X						
SQ process training	Quarterly	++	X	X	X	X	X		X						
Staff performance review & development	Quarterly	++			X	X						X	X		
Micro one-day internships in different service departments	Quarterly	+	X		X						X	X	X		
Moderated SQ system workshop with key stakeholders – Focus on strategy	Quarterly	+++	X				X		X	X	X	X	X	X	X
Job specifications review and update	Annually	+			X	X									

Table 6-2: List of regular activities potentially enhancing service capability

6.2.3. Institutionalisation

The success of efforts made to sustainably improve the SQ process arguably depends on the degree to which they form part of a culture of a service organisation which is mirrored by institutionalised routines. A set of consistent practices should be embraced by the entire service organisation and driven by its management team. The proposed routines give substance to the investments and time allocations referred to in Figure 4-15: Policy option 3: Work smarter. Service management teams need to ensure that these routines do not fall victim to the urgency of day-to-day activities and follow them with equal discipline, arguably a big risk in light of the high work-pressure context of commercial vehicle dealerships.

These routines should be considered high-level guidelines as opposed to detailed prescriptions. Function-specific activities need to be derived and focal points adjusted based on emerging needs. Regularly organisational routines should be subjected to critical evaluation.

6.2.4. Evaluation

Once per quarter, key stakeholders of the dealership team should convene to take stock of the progress made with respect to the routines designed to affect static and dynamic service capabilities. The audit results of the SQ process should be used as a diagnostic tool that initiates a discussion about the service capabilities of the organisation. The workshop should accommodate the exploration of problems in their systemic context, but it should also initiate action. Therefore, leading questions could be: (1) What is the problem with the routine (no effect; delayed effect; side-effect)? (2) What causes the problem (content; context)? (3) How can it be resolved (routine modification; routine replacement)? (4) What needs to happen now (redesign; communication; implementation)?

6.3. Conclusions

This final chapter of this pragmatist thesis has provided useful recommendations for service practitioners in South African commercial vehicle dealerships seeking to sustainably improve SQ through the application of the key principles of SD. Informed by the well-established cycle of planning, doing, checking and acting, this chapter presented a practical framework, which translates the core findings from this research, into hands-on guidelines and checklists for service managers. Although service organisations might need consultants to start the process, through the serious engagement with system-based approaches they will be able to develop the necessary thinking skills to benefit from this set of tools.

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APPENDICES

Appendix A. Phase 2: Research consent form

Edinburgh Napier University Research Consent Form

Edinburgh Napier University requires that all persons who participate in research studies give their written consent to do so. Please read the following and sign it if you agree with what it says.

1. I freely and gladly consent to be a participant in the research project on the topic of "Applying the principles of system dynamics to service quality—The case of commercial vehicle dealerships in South Africa" to be conducted by Christoph Thiele (christoph.thiele@napier.ac.uk), a doctoral student at the Business School of Edinburgh Napier University, United Kingdom.
2. The aim of the study is to develop an operational framework rooted in the principles of system dynamics to enhance service quality in South African commercial vehicle dealerships. Specifically, I have been asked to participate in an interview, which should take no longer than 1 hour to complete.
3. I have been told that my responses will be anonymised, unless I waive my right to anonymity. My name will therefore not be linked with the research materials, and I will not be identified or identifiable in any report subsequently produced by the researcher. Participating in this study will in no way affect my career.
4. I also understand that if at any time during the interview I feel unable or unwilling to continue, I am free to leave. That is, my participation in this study is completely voluntary, and I may withdraw without negative consequences. However, after data has been anonymised or after publication of results it will not be possible for my data to be removed as it would be untraceable at this point.
5. In addition, should I not wish to answer any particular question or questions, I am free to decline.
6. I have been given the opportunity to ask questions regarding the research and my questions have been answered to my satisfaction.
7. I have read and understand the above and consent to participate in this study. My signature is not a waiver of any legal rights. Furthermore, I understand that I will be able to keep a copy of the informed consent form for my records.

Participant's Signature _____ Date _____

I have explained and defined in detail the research procedure in which the respondent has consented to participate. Furthermore, I will retain one copy of the informed consent form for my own records.

Researcher's Signature _____ Date _____

Supervisors:

Dr Sarah Sholl [redacted]

Prof. Dr Dominik Hammer [redacted]

Dr Allan Ramdhony [redacted]

Appendix B. Phase 2: Interview schedule

Since semi-structured interviews were used for the data collection, the following schedule was not strictly adhered to but served as a broad guide to tap into perceptions and experiences of SQ experts concerning the key factors of sustainable SQ. Respondents were questioned keeping in mind the following three central themes: understanding of SQ, enablers and inhibitors of sustainable SQ in commercial vehicle dealerships, and emerging trends in SQ. However, the participant could flexibility change the order and content, which were very much dependent on the direction the conversation took between the researcher and the informant.

Stage 1: Introduction

- Purpose of study
- Participants' involvement and required time investment (30-45 minutes)
- Confidentiality and anonymity
- Clarification of themes: Enablers and inhibitors of sustainable SQ
- Permission request to start recording

Stage 2: Interview

- Theme 1: Understanding of SQ
  - Definition
  - Main dimensions
  - Importance to businesses and their customers
- Theme 2: Enablers and inhibitors of sustainable SQ in commercial vehicle dealerships
  - Service employees
    - Management commitment
    - Non-technical skills
    - Technical skills
  - Supporting structures
    - Process frameworks
    - IT systems
    - Renumeration
    - Training
- Theme 3: Emerging trends in SQ
  - Digitalisation & automation
  - Systems integration
  - Human touch

Stage 3: Closing

- Is there anything you would like to add or ask?
- Thank you for your time!

Appendix C. Phase 2: Sample interview transcript

Who	Text
C	What does service quality mean to you?
I-6	I think first of all, we are all customers. So, we all have experience about service quality the whole day, the whole life. So, this means every customer, everywhere in the world has some need for service quality. I our industry, customers are earning money with our products. So, the basis at least is that you can still earn the money that means they need a basis quality. And in addition, I think if the quality is better than of our competitors, this can be a differentiator. Beside the product, I think, the quality, which we gave to our customers is one of the main benefits to make his life easier and, at the end of the day, at xxx you know we have this simplifying business approach, which also means a higher quality and this means also to say the customer to choose xxx again because of, one side is product, on the other side is the service and the service quality we are able to deliver to them.
C	Which are the most important dimensions you have come across for our customers?
I-6	Good question, the most important one when I talked to customers as I mentioned before, whatever we promise to our customer we should deliver that. For example, I had a discussion with a customer in the circumstance of a breakdown. So, at that time the workshop said, ok, 'we'll fix it until, I don't know, in two days'. But unfortunately, it took at least 4 days. And the customer complaint was not about the four days at all. But, 'come on guys, if you told me that it's four days, then I'm able to take different countermeasures. So, I was prepared for two days. That means, I let the driver in the truck. At that time, it was also fine for me to leave the goods in the truck but four days is a totally different story. What every you promise to me, please deliver. If you told me four days, that's not good at all but then I can prepare myself in a better way. So, for me, service quality means for me, whatever we say, we deliver, and we are transparent about what we are doing.
C	What are the aspects, you have come across, that make it difficult for you, in your area of responsibility, as a head of a central division, to provide service quality to your customers, which are national sales companies and importers, from my understanding?
I-6	Yeah, some of our issues go directly to the point of service and there are some things we deliver directly to the end customer. At the end of the day, the point at the headquarters, it is you deal with so many different [importers] and of course the customer expectation is maybe different in different markets. On the other side, the point is, we are here in Germany we have close relations to our German organisation, but this is also the biggest organisation. So, whatever we bring to the market, we have to keep in mind, what is this organisation able to do? It is totally different in Germany, also the customer expectation, from the organisation itself, is it professional? Is it a big organisation? Or, if you go, for example, to overseas markets, which have totally different style, maybe totally different expectations. At the end of the day, so we have to find somewhere in the middle or, sometimes, we have to differentiate. To say these are markets A, we have a different approach to markets B or C and this, for us means, no general approach. We try to it as general as possible, but this doesn't fit to every market. So, from time to time, we have to realign ourselves. If the approach is still the right one, if market grows or develops or whatever. As you may know, at headquarters we try to make it as easy as possible but there is no one size fits it all.
C	And if you were to dig a little bit deeper or to expand a little bit on the approach. Which pillars are you referring to? Meaning, are you referring to trainings, or systems?
I-6	At the end of the day, it anyhow starts with the idea, the concepts, or what do we want to implement in the market. [SQ process], for example, is one of the general core processes at the point of service and then the core process itself you can do by hand and by paper or you can do it highly integrated in DMS [Dealer management system]. The question is always: 'what do we have in the market?' anyways, you need at least the change of the people. Generally, we believe that whatever we bring to them, the people change easily. This is, in real life, different. So, first thing is really to convince the organisation that they are willing to change. And this is not by sending an email or a presentation. This is really, you have to go there, you have to talk to the people. You have to understand what they are doing today, and then find out, what is the change and how to do the change. Of course, this goes hand in hand with process analysis and, at the end, if you are really lucky, you'll have some system, which are helping, which make it easier to do that. But the first thing is really to start with, is the change process that the people are willing to change. Very often we find out that people coming for training. In the training everything is find. When they then come back to the workshop. All say, now you are back to real life, forget about that now we'll do like yesterday. And so, you'll never go to service quality. So, this is my experience. We have to work on all pillars, really to transport the idea that this is the first one, to get people involved, they say, 'yes, we want to do that', then training and then supporting by the systems.
C	Could you give an example, possibly, where this worked quite nicely from idea generation, conceptualisation, then involvement of the main stakeholders…

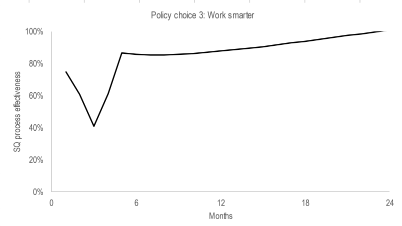
I-6	Yeah, we started two years ago some analysis driven by customer experience, we had this customer questionnaire [customer satisfaction index], this is a standard questionnaire to our customers, and we started from the customer side. So, what are the weakest points in that and so we found out that especially when the customer gets in touch with us, we had some deficits. So, that means, for example, how to get in contact with us, when they come to our workshop, that we are all prepared and the next one is, whenever they come that we are not able to say what is the cost of these repairs or that we are not meeting the expectation of the customer be able to tell when the truck comes back. We found out that it is mainly driven by weaknesses in our systems. So, in Germany, we had for the old partners and old DMS system together with various other systems and two years ago, we decided to close that gap and we started by asking people outside what they are missing. We involved some markets and really go to the workshops to find out the pain points. Where we are losing time, where our system is not seamless, and so, after that, we said, ok, we definitely need to update our systems. And no, we have several modules adapted and put in addition. We are now in rollout, one is the service take-in and also, we will have some service calculators, which makes it easy to have a cost estimate. And, right now, we are back in the field and we are bringing them modules to the service advisors at the point of service. And we have some still develop with us. What we found out, if you involve the people, first they say this is a weak point, now they saw the results, they have developed with us together they highly appreciate it. Now working for this product. All the markets here, we start in Europe, they say, now when will this product come, this is really helpful and will safe us more time. So, I think this was a good example by doing that even if these are basics, but these will definitely make the life of our staff easier if their life easier. Let me say, they can satisfy our customers.
C	And while implementing those system changes you have mentioned, which barriers did you come across within your organisational context? I assume you would have had to rely on other departments to commit resources and so forth?!
I-6	I think, this is meanwhile all over the same, at the end of the day, for the first thing internally, you need, let me say, a business case, which shows you anyway that you can save money, or earn more money but what we do in addition, we brought with all those actions in, the customer satisfaction index. So, that we don't forget about the customer. In the past, very often, we were only calculating money, but now we are also calculating how count this in or what are the benefits for the customer? But at the end of the day, first thing, from headquarter staff, I think what we want to achieve this is all clear for the people here but start such a project, anyway you have to convince the controller or whatever. So, without a business case it makes no sense to start it.
C	How did you quantify customer satisfaction in monetary terms? I am aware there is an index, but did you use financial figures to support your case or …
I-6	So, one this is, we some internal figures that means, what can we safe in our workshops. We had different systems, we had double work, we have maybe potential for mistakes, because we have to type in VIN numbers three times or we are not able to give a cost estimation, which maybe results in that the customer will not give us this job. So, we made some analysis and some studies and then we found out, how many times we are, let me say, we are losing internal time. With this internal time, you can make some Euros. On the other side, we go into some of our workshops and you always have the 10%, always doing everything and you have the other ones, which are doing not in that time. We find out that the better you are organised, then you have some upselling potential. If you are doing cost estimations you will get the jobs and, so, we are analysing, say, really good workshops, with a high customer relationship and, based on that, we make an estimation, how will that influence the business of the others.
C	What recommendations would you give to dealerships when it comes to investments into service quality? Maybe I give you a little bit of background. One of the triggers for my research was, in fact my work experience as service core process project manager, during which phase I observed steady improvement across our network in fact but I found out that two years after the formal implementation of service quality, many dealerships had dropped the ball. So, the efforts did not last, they were not sustainable. So, how would you address the topic of sustainability.
I-6	The first thing is, I think, if you go to the dealerships, especially private capital, if the boss of that dealership does not believe in that, it makes no sense. I had this also in former times, this was in the car industry, at that time, we went out and implemented service core process, and at that time, this was not for free. We took some money for that. But we also calculated their business case. We told them, ok, if you are doing this and this, your turnover will increase by that, and this is also, let me say, from the management or from the owner ones, if the owner of the workshop is not really 110% behind it, it's a hard stuff. On the one side, they need the pressure from their side. On the other side, and this is what we can do from [importer] side, you need some support in coming back and asking, asking, asking. What do I mean with that? And that time we had a concept that shows, 'ok, we are coming in first analysis, then we gave them some jobs, then we are coming three months later. Then we are coming again three months later, again three months later. So, we are more or less besides them the first year. Because one thing is, to give a presentation, another thing is to say 'yes, I got it' and to bring it to bring it to live and make to every day's life. So, what we were doing from that time, this was in German market. We had the field force, after sales field force and they were really

	going hand-in-hand with the dealers the whole time. Whenever they found out there was something wrong, we show the dealer something goes wrong. Of course, we were doing, we had some ISO audits in the workshops and we also had some testing of the workshops and this was all around the service core process. So, then also we from [importer] side, had a chance to show that to the dealer, not to blame him but to say, 'hey, be careful, you invested money, you really believe in that, and something goes wrong to realign. As a start its fine but you have to realign again and again and again. It's always in after sales, when you think you are there already, you have to start again. This is not by implementing once a time. So, the service core process, let me say, the first step, like the rollout is like the first date with a girlfriend but, to implement it, that's after marrying. The whole life, that the same. And it's not done by, ok, we did it yesterday, now everything is done, then you will lose, definitely
C	So, continuous follow-up …
I-6	Yeah, and I also think it is really helpful to implement some KPIs and some monitoring tools in the workshop. It depends a little bit on the workshop, it's not all the same but they must measure it. They really must measure it and on the other side sometimes, we from the headquarter or from the [importer] side, it's sometimes, we have more data, it's easy to show it, as I mentioned in the car industry, we show the dealers, because we make also some customer satisfaction index there and we show the owners of the dealerships how satisfied their customers are, we also show them if there are some customers changing the workshop – In the car industry first they change the workshop, then they change the brand – and we also show them some risk potential. And this is one thing, especially in our industry, if you show risk potential or if you show money that you can easily earn or maybe you lose, then you have the owner on your side. This is a figure he looks at every month, and if then somebody came to him and explained to him and then took the measures, this is then a chance to say, 'let's keep this very stable.'
C	Business case at the end, again. Yeah, in South Africa we've got another, rather big challenge, which is attrition rate. So, staff turnover, and this is coupled with a fairly low level of skills and competencies with the position of service advisor. So, service advisors in the German context, they are at least, trade tested artisans and worked as a foreman, so they are technical and have soft skills. And in South Africa, we were unable to convince dealerships to invest substantially in Service Advisors. I am rather reflecting than asking questions, but this is rather one of the reasons the benefits were not sustainable.
I-6	I think the service advisor is really the core person, we also made some analysis in the past, I mentioned we made some workshop testing, customer satisfaction in addition. So, what we found out, if the workshop makes a really good job, then it can also happen that if service advisor is bad that the customer perception is bad or on the other side, we've had workshops we know from the testing, they have to train a lot but they have a perfect service advisor. And he sells, that the customers are perfectly satisfied. So, the service advisor is, from my perspective one of the key persons, especially if you differentiate, you have the same level in the workshop because they are all trained, then the service advisor makes the difference.
C	But, the service advisor has to be technical, isn't it?
I-6	Yes, in our industry of course, yes. So, in the car industry it is a little bit different. But in our industry, yes of course, the basics must be there, the basic understanding, let say, but on the other side, if he or she is a clever one, to make the customer relationship, to build it up. Basic on the technical issue, but how to deal with the customer, I think this is, in addition, let me say, necessary, and one of the differentiators. Because if you know your customer, if you know your customer needs, one thing is, the customer comes to me but the really good one, they have a really pro-active approach. They are using modern tools, they are, maybe from time to time, go to the key customers, discuss with them, I think this is a thing we didn't do often enough but if you have big customers, big fleets in your workshop, you invite them for regular meetings with them, why not? This can be very helpful for a service advisor because you need an understanding and, this is what we saw also here in Germany, all over the world. Even if these are customers driving trucks, they have totally different approaches. Once customer says, 'ok, we take bare maintenance contracts, everything in your workshop', others say 'no I have a workshop on my side'. Some customers say, 'in the breakdown case, I call the [name of breakdown service], I want everything there. Others say, 'no, call first my guys, they will change the business appoint (?).' We have to understand the customer needs and the customer approaches, I think, to offer the right products. Also, not every size fits all. I think if you have a better understanding of the customer, it's much easier to offer the right things.
C	Lastly, how do you see the industry evolving over the next 3-5 years, what projects or initiatives do you see as high relevant to boost service quality in order to meet evolving customer demand?
I-6	I think, there are two directions. One is, what we already discussed, let me say, is still human, and still have a face to the customer, and then I come to the other side, it's using all digital possibilities. What do I mean with that? I had some experience last, with xxx, for example. So, I ordered something, and I think, not Amazon made the failure, it was one of the forwarders. I think it was xxx or some of these guys. Maybe they lost the goods and then gathered, 'ok, you have to do this or this' I sent Amazon an email and it was in the evening, I said 'hey guys, something is wrong, I have no clue about that. Can you help me? I received a reminder, 'hi Mr xxx, we will take care within 12 hours'. One hour later, 8 in the evening, the phone rings, 'here is xxx from Amazon, we realised and this what happened, called the person, done. Do you have other

	questions?' Ok, that the point. On the one side, we will digitise more and more things. And we have to go on that. We have tons and tons of data. We have to analyse and we have to discuss with our customers how this data can help us work together. But in the case somethings goes wrong, or when the customer wants to talk to us, if there is a human person pick up the phone, I think this is from customer side, especially in this digital world, you can say, hey, I'm still a human and whatever you have, I'm still there for you. These two points combined together, still human and on the other side using all the data is definitely one of the key figures.
C	Thank you for the interview.

Appendix D. Phase 3: SD simulation model in Microsoft Excel

Constants		
Service transactions	250	Per month
Process change requests	2	Per month
Static service capability - Investment rate	y = 4E-05x + 0,008	
Static service capability - Erosion rate	1%	Per month
Dynamic service capability - Investment rate	y = 0,002x + 2E-17	
Dynamic service capability - Erosion rate	1%	Per month
Exploitation - Share of time spent	**60%**	125%
Exploration - Share of time spent	**40%**	10%
Delay 1	3	month
Delay 2	3	month
Weighting service transactions vs. Process changes	2,00	3
Static service capability - Investment rate	**2,0%**	
Dynamic service capability - Investment rate	**2,0%**	
Leverage factor dynamic capability	4,00	
Minimum SQ process level	0%	
Max capability level	120%	



Time in months	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Static service capability - Beginning balance		75,0%	76,0%	77,0%	78,0%	79,0%	80,0%	81,0%	82,0%	83,0%	84,0%	85,0%	86,0%
Investment rate		2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Erosion rate		1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Static service capability - Ending balance	75,0%	76,0%	77,0%	78,0%	79,0%	80,0%	81,0%	82,0%	83,0%	84,0%	85,0%	86,0%	87,0%
Dynamic service capability - Beginning balance		50,0%	51,0%	52,0%	53,0%	54,0%	55,0%	56,0%	57,0%	58,0%	59,0%	60,0%	61,0%
Investment rate		2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Erosion rate		1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Dynamic service capability - Ending balance	50,0%	51,0%	52,0%	53,0%	54,0%	55,0%	56,0%	57,0%	58,0%	59,0%	60,0%	61,0%	62,0%
Open service transactions - Beginning balance		50	159	275	380	481	580	676	769	860	947	1031	1113
New service transactions		250	250	249	248	247	246	245	244	243	242	241	240
Completed service transactions		141	143	144	146	148	150	152	154	156	158	159	161
Open service transactions - Ending balance	50	159	267	380	481	580	676	769	860	947	1031	1113	1192
Completion rate		47%	35%	28%	23%	20%	18%	16%	15%	14%	13%	13%	12%
Open process change requests - Beginning balance		2	0	0	0	0	0	0	0	0	0	0	0
New process change requests		2	2	2	2	2	2	2	2	2	2	2	2
Realised change requests		4	4	4	4	4	4	4	5	5	5	5	5
Open process change requests - Ending balance	2	0	0	0	0	0	0	0	0	0	0	0	0
Realisation rate		100%	204%	208%	212%	216%	220%	224%	228%	232%	236%	240%	244%
		14%	6%	-26%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	75%	47%	35%	88%	86%	86%	85%	86%	86%	87%	87%	88%	89%
SQ process effectiveness	75%	61%	41%	61%	87%	86%	85%	86%	86%	86%	87%	88%	89%

Time in months	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Static service capability - Beginning balance	87,0%	88,0%	89,0%	90,0%	91,0%	92,0%	93,0%	94,0%	95,0%	96,0%	97,0%	98,0%
Investment rate	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Erosion rate	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Static service capability - Ending balance	88,0%	89,0%	90,0%	91,0%	92,0%	93,0%	94,0%	95,0%	96,0%	97,0%	98,0%	99,0%
Dynamic service capability - Beginning balance	62,0%	63,0%	64,0%	65,0%	66,0%	67,0%	68,0%	69,0%	70,0%	71,0%	72,0%	73,0%
Investment rate	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Erosion rate	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Dynamic service capability - Ending balance	63,0%	64,0%	65,0%	66,0%	67,0%	68,0%	69,0%	70,0%	71,0%	72,0%	73,0%	74,0%
Open service transactions - Beginning balance	1192	1268	1341	1411	1478	1542	1604	1663	1718	1771	1821	1868
New service transactions	239	238	237	236	235	234	233	232	231	230	229	228
Completed service transactions	163	165	167	169	171	173	174	176	178	180	182	0
Open service transactions - Ending balance	1268	1341	1411	1478	1542	1604	1663	1718	1771	1821	1868	2096
Completion rate	11%	11%	11%	10%	10%	10%	9%	9%	9%	9%	9%	0%
Open process change requests - Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0
New process change requests	2	2	2	2	2	2	2	2	2	2	2	2
Realised change requests	5	5	5	5	5	5	5	6	6	6	6	6
Open process change requests - Ending balance	0	0	0	0	0	0	0	0	0	0	0	0
Realisation rate	248%	252%	256%	260%	264%	268%	272%	276%	280%	284%	288%	292%
	0%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	2%
	90%	91%	92%	93%	95%	96%	97%	98%	99%	101%	102%	97%
SQ process effectiveness	90%	91%	92%	93%	94%	95%	96%	98%	99%	100%	101%	100%