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Master’s Research

Servitization Adoption in the South African Construction Industry: A Business Model Canvas approach

By

Ramafalo Rotondwa Benevolence

A Masters Research submitted in partial fulfilment of the requirements for admission to the study towards the degree of

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in

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in the

Faculty of Engineering and Built Environment

at the

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Declaration

I Ramafalo Rotondwa Benevolence hereby declare that this master’s research dissertation is wholly my own work and has not been submitted anywhere else for academic credit either by myself or another person. I understand what plagiarism implies and declare that this proposal is my own ideas, words, phrase, arguments, graphics, figures, results and organization except where reference is explicitly made to another’s work. I understand further that any unethical academic behaviour, which includes plagiarism, is seen in a serious light by the University of Johannesburg and is punishable by disciplinary action.

Signed…………………… Date……01 December 2018….
Abstract

The construction industry in South Africa and beyond has gained a reputation for delivering products to its clientele. As such, the industry has remained fixated on the attainment of the parameters associated with the iron triangle time, cost and quality; and more recently sustainability. This has prioritized project management success above project success. Accordingly, industry clients have been provided with buildings and infrastructure which do not achieve the initial objectives which led to their commissioning in the first instance, hence the prevalence in dissatisfied customers. The emergence of servitization and servitized business models stems from a need to curb this trend. Servitization is considered as a move from just selling products to offering a coordinated blend of products and services that deliver value in use. Yet, whereas other economic sectors have deployed this business model to enhance user/client satisfaction, the construction industry seems to be lagging. This study explored the factors influencing the adoption of servitization in the South African construction industry, relying on examples from other sectors. A systematic literature review was adopted as the research design for this study. Literature identified was selected based on a set of keywords, over a specified period and the database consulted. The selected articles were analysed using qualitative content analysis (QCA) based on pre-selected themes. The results show that the expanding attention for increasing profit margins, service component, competitive advantages and mostly “sustainability” are probable factors influencing the adoption of servitization in the construction industry. Furthermore, the study identified the critical success factors as well as failure factors which will affect the adoption of servitized business models in the South African construction industry. Finally, leveraging on the identified factors mentioned previously and the business model canvas (BMC), the study proposed a conceptual framework for the adoption of servitized business models in the South African construction industry. This study contributes to body of knowledge on product-service systems, especially as it pertains to servitization in the construction industry. Expectedly, the findings from the study will provide a platform for sustained discourse around the applicability and utility of these models in the South African construction industry in bringing about increased value-in-use for clients across the lifecycle of projects.
Definition of terms

**Accountable**: Answerable, responsible and justified

**Cloud computing**: Procedure of utilizing a system of remote servers facilitated on the Web to store, oversee, and process information, instead of a local server or a PC

**Conceptual framework**: Ideological and theoretical assumptions that underlie a

**Conceptual**: A set of ideas or principles and their relation to each other.

**Explicit**: A clear, understandable statement of all the relevant details

**Map (systematic)**: A systematic description and analysis of the research field defined by a review question

**Qualitative research**: In-depth enquiry in order to understand the meaning of phenomena and their relationships. Review question and may be implicit or explicit.

**Review**: A critical appraisal and analysis of literature

**Synthesis**: Creating something new from separate elements (a synthesis of findings from studies to answer a review question).

**Systematic review**: A review of the research literature using systematic and explicit accountable methods

**Systematic**: Undertaken according to a fixed plan or system or method
List of abbreviations

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<th>Description</th>
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<td>Built Environment</td>
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<tr>
<td>BIM</td>
<td>Building Information Modeling</td>
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<td>BMC</td>
<td>Business Model Canvas</td>
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<td>CI</td>
<td>Construction Industry</td>
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<td>CF</td>
<td>Conceptual Framework</td>
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<td>PFI</td>
<td>Private Finance Initiative</td>
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<td>Public Private Partnerships</td>
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<td>SLR</td>
<td>Systematic Literature Review</td>
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List of Publications

The following publications form part of my Masters Dissertation study:

1. Authors: Rotondwa B Ramafalo¹, Bankole O Awuzie², and Clinton Aigbavboa³
   Title: Servitization in Construction: An Identification of Drivers

2. Authors: Rotondwa B Ramafalo¹, Bankole O Awuzie², and Clinton Aigbavboa³
   Title: Probable Challenges Facing Servitization Adoption in Construction: Lessons from the Manufacturing Sector.
CHAPTER ONE: RESEARCH BACKGROUND

1.1 Introduction
The expanding attention for sustainability is driving the construction sector to build more sustainable structures. Environmentally, sustainable building construction has encountered significant growth over the previous 10 years (Berardi, 2011). The public is becoming more mindful of the advantages of green construction as prominent legislators, superstars, documentarians, and authors highlight the built environment’s effect on greenhouse gases emissions and natural resource consumption (Robichaud and Anantatmula, 2011). Different elements, including higher energy costs, increased costs of building materials, and controlling inducements, are additionally pushing the green building business sector to develop and extend. However, challenges to green building keep on existing, including the capacity to deliver a green project within tolerable cost constraints. For project managers to deliver on sustainable construction project mandates, within the client’s budget, adjustments must be made to traditional project management procedures and practices (Robichaud and Anantatmula, 2011). Also, they are required to find ways to engender sustained value creation/addition across the lifecycle of the project within the construction industry for clients and end-users.

The debate on what precisely constitutes sustainable development is in no risk of subsiding at any point in the future. In any case, regardless of its unverifiable definition, individuals, governments, organizations, and associations of every size and from every area of the globe are finding a way to determine what are evidently unsustainable practices in numerous areas, including construction. Therefore, significant research is directed, and on-the-ground measures executed, with the objective of creating construction projects that is more in accordance with the standards of sustainable development (Nicol, 2011).

For instance, achieving energy efficiency in buildings has assumed the front line position in contemporary discourse because of high energy costs and environmental concerns. Improving energy efficiency in new commercial buildings is one of the most effortless and least cost choices to lessen a building's energy use, proprietor operational expenses, and carbon footprint (Kneifel, 2010). The extent of sustainable, green or energy efficient structures that have really been built
stays low in spite of the clear significance of the building sector during the process of environmental change and the expanding popularity of the point of sustainability within the building sector, which is underlined by the quantity of sustainable and green building certificates and devices (Feigie, Wallbaum, and Krank, 2011). In this instance, clients will be requiring “Green” as a service instead of a product which yield the desired service standards as it concerns energy efficiency.

Wallbaum, Silva, du Plessis, Cole, Hoballah and Krank (2010) have characterized different measures for upgrading the number of sustainable buildings, either recently built or renovated, to lessen resource utilization and meet the issues of the social, economic and ecological proportions of the built environment:

- influencing the interest for housing, retail and service zones, industrial zones, and infrastructures
- controlling the supply of construction products
- changing the management of existing structures and structures
- influencing stakeholder conduct and considerate in particular socio-social contexts.

It is quite clear that extant construction business models are geared towards product delivery not delivery of services. And this has exacerbated the lack of acceptance of delivered products by clients as the products end up not satisfying clients’ objectives during operational phases. This disjuncture is not peculiar to the construction industry alone but also to peer sectors like manufacturing, financial services, etc. Manufacturing firms have consistently delivered services, by providing spare parts, installing equipment, training staff, or providing client support. This approach has led to a disconnect as elucidated previously in competitive markets however, firms have started looking at better approaches to utilize servitization as a platform for merging these hitherto disparate offering go provide more value to customers (Baines et al., 2007; Tukker and Tischner, 2006; Vandermerweand Rada, 1988). Arguably, the transition to servitized business models in these sectors has lessened the incidence of such friction between producers as end-users because of the integration of production and service offerings in a manner that allows clients to derive optimal value in use from the product-service system.
Servitization, a term first used by Vandermerwe and Rada (1988), is currently generally perceived as a way of creating value through the addition of services to products. Since the late 1980s, its appropriation as a competitive manufacturing technique has been considered by scholars who have particularly looked to comprehend the advancement and consequences of this idea (Wise and Baumgartner, 1999; Oliva and Kallenberg, 2003; Slack, 2005). Literature shows a developing enthusiasm for this theme by the scholarly community, business and government (Hewitt, 2002), a lot of which depends on a conviction that a move towards servitization is a way to create additional value adding capacities for conventional manufacturers. The question behind all the aforementioned remains; how can the construction industry change its business model from project oriented to service-oriented business models to curb the incidence of client dissatisfaction?

1.2 Research Problem Statement
Servitization is considered as a move from just selling products to offering a coordinated blend of products and services that deliver value in use (Sawhney, Balasubramanian, and Krishnan, 2004). In general, service refers to a wide number of different activities and they can be seen as part of a product or vice-versa (Hytönen, 2005) provided in order to satisfy customer needs (Grönroos, 2000). Hytönen (2005) argues that majority of products offered on the market today consist of both products and services, with a greater emphasis on the product offered. In this manner, servitization evolved from the notion that clients stand to benefit from products when they are complemented by services which all in all deliver value-in-use (Vargo and Lusch 2004, 2008). Clients in South Africa are increasingly demanding for added value on product offerings bothering on “Green” and “Sustainability” while on the other hand the government and co-operative clients are looking for ways to deliver buildings that are more energy efficient.

Clients/customers are purchasing products that have no value added and services. It is therefore the main goal that servitization concept strives to achieve by making a common incentive through a move from selling product to offering Product-Service Systems. A few authors propose that manufacturing companies incorporate services among their principle offers (Savvy and Baumgartner, 1999; Brax, 2005; Mathieu, 2001). As indicated by Sawhney et al. (2004) manufacturers can discover new business openings by adding services to their chain, completing exercises previously done by the client or presenting adjoining chains. According to Brax (2005), to increase the value of the primary chains, services can be joined with substantial products to separate them from contending products. Further, a few motivations for the incorporation of
services into an organization’s product offerings like the extension of association with clients, making open doors for construction in advanced markets, adjusting the monetary cycles with various money streams have been observed. However, it remains to be seen how the South African construction industry can modify their product delivery approaches to attend to the growing demands of clients through the incorporation of services as is the case in manufacturing sector. From the foregoing, this study sought to explore how the South African construction industry can leverage on the concept of servitization to attend to client needs.

1.3 Research Question(s)
The central research question of this study is: “How can the South African construction industry leverage upon servitization to deliver whole life value to clients?”

The research sub-questions of this study are as follows:

- What is servitization?
- How does it apply to construction?
- What factors are crucial for optimal servitization?
- How can servitization be adopted by the South African construction industry to provide whole life value to industry clients?

1.4 Research Aims and Objectives
The research study aims to propose a Conceptual Framework for adoption of servitization in the South African Construction industry using the Business Model Canvas (BMC) approach. The study attempts to answer the above mentioned sub-questions with the following objectives:

- To define the concept of servitization.
- To explore applicability of servitization in the construction industry.
- To identify the most prevalent success/failure factors that influence the adoption of servitization in the construction industry relying on examples from other sectors.
- To propose a business model canvas-enabled conceptual framework for the adoption of servitization in the construction industry based on construction clients and construction companies.
1.5 Research Methodology
For the purpose of this study, a qualitative research method was adopted which works with non-numerical data and it seeks to interpret meanings, interpretations, symbols, and the processes and relations of social life from the existing literature. In furtherance, a Systematic Literature Review (SLR) was also adopted as the research design for this study. The SLR confines itself with seeking answers to questions about the ‘what’, ‘how’ or ‘why’ of a phenomenon rather than ‘how many’ or ‘how much’, which are answered by quantitative methods. Additionally, SLR can examine old theories and propose new ones, consider where the balance of evidence lies in relation to a particular topic, and provide a basis for recommendations for interventions (Venkatesh, Brown, and Bala, 2013; Rittichainuwat and Rattanaphinanchai, 2015).

Since the research methodology for this study is qualitative in nature, the use of select keywords and an identification of relevant databases within the set timeframe in which the research papers where published was considered and adopted. Moreover, a qualitative content analysis (QCA) was used to analyze the selected articles built on the pre-selected themes. Five key activities were followed in gathering and analyzing the content of the reviewed literature which included: review of question, searching of literature, critical data appraisal, data extraction, and data synthesis which are discussed into detail in the research methodology chapter. Later, the findings will be presented in table formats, graphs and again according to pre-selected themes.

1.6 Significance of the research
Besides economic reasons, the necessity for continuous improvement in the construction industry originates from the nature of the industry. The construction industry is extensive and complex. It is also diverse, with many components impacting its performance, prosperity and prospects at many levels. The industry is ordinarily fragmented as far as the roles of the participants and also the dispersion of the scopes within the firms. Again, it is relevant to note that numerous past attempts to enhance the industry’s performance in different countries have failed to succeed (Ofori, 2012).

The increasing request by construction industry clients for the industry to deliver projects that serve the intended purposes has given verve to the prioritization of product/service functionality over the iron triangle parameters of time, cost and quality- wherein quality is described as adherence to specifications. An adherence to specification differs from functionality and this
happens to be a main cause of client dissatisfaction in products provided by the industry. Since most end-users (clients) are dissatisfied by the products delivered which do not fit for the purpose and not in line with the required purpose, thus, this study makes a salient contribution towards curbing this problem by exploring and highlighting the utility of servitization adoption in the industry.

It is not only about clients being offered products, but again the services that will follow. Manufacturing industries has done it successfully to an extent (Vandermerwe and Rada, 1988; Hytönen, 2005; Tukker and Tischner, 2006; and Baines et al., 2007) and now there is a need for the construction industry to consider the utility of its adoption within its context to drive client satisfaction.

1.7 Dissertation outline
Chapter 1: Research Background - This chapter introduces the concept of “Servitization”, how it evolved, and how it came about that clients refer servitization as a way of adding value and meeting the client’s needs. The problem that prompted this research study, the fundamental elements of this research in the form of objectives, and the significance of the study are clearly outlined in this chapter.

Chapter 2: Literature Review (on Servitization) - This chapter is a critical and analytical literature review of the context of this dissertation. The highlights the nature of the construction industry and its characteristics, challenges faced, the evolution of servitization, procedures, and benefits that comes with the adoption of servitization.

Chapter 3: Literature Review (Cross-Sectional) - This chapter introduces study of servitization across different sectors through a review of literature. Again, this chapter highlights the process of servitization, the probable drivers towards servitization, challenges faced that may hinder the adoption of servitization, opportunities that may arise, and lastly but not least, the benefits can servitization can bring. In brief, this chapter compares the similarities and dissimilarities of servitization from different sectors that have a close relationship with the construction industry.

Chapter 4: Business Model Canvas (BMC) – This chapter introduces a BMC, the purpose it serves in businesses, and description of its nine building blocks. Furthermore, this chapter aims to link the utility of a BMC as a conceptual framework for elucidating the adoption of servitization and shift form normal business models to servitized business models.
Chapter 5: Research Methodology – This chapter outlines and describes the research method and research design employed by the researcher in order to facilitate data gathering, synthesizing, and data analysis from the existing literature using qualitative method and SLR as design.

Chapter 6: Presentation and Discussion of findings – This Chapter presents and discuss the success factors for adoption of servitization, failure factors, probable drivers, challenges and opportunities, and lastly, it presents the proposed BMC for the construction industry. The findings are presented through tables, graphs, models, and later discussed according to the pre-selected themes.

Chapter 7: Conclusion and recommendations - This chapter concludes the research confirming whether the researcher achieved the objectives of the research or not. It is hoped that the research findings will provide information which will facilitate the curbing of the problem and later give recommendations for the future studies.

1.8 Delimitations and Limitations
The researcher only evaluated businesses that have used servitized models in South Africa, drivers, challenges faced by those who are meant to deliver and opportunities that might to them. Although this study is looking at the South African construction industry context, it will also evaluate the construction companies and construction industry clients solely. The study also confine itself to exploring the phenomena of servitization with business models in South Africa and beyond, perhaps, who have adopted servitized business models in delivery of projects to ascertain whether the required value for client satisfaction is met or/and delivered.

1.9 Chapter summary and link
This chapter was an introduction to the topic under study and it outlined the main aim of the research, the objectives and the significance of the study. This chapter also highlighted a brief background of the topic under study and the need for performing the study. With the brief background of the concept of servitization and what the concept entails, this chapter pointed out the need for adoption of servitization in the construction industry and the benefits that may accompany its successful adoption. Having successfully established the research background and what the study aims to achieve, this study shall proceed to discuss the nature of the construction industry as well as the evolution and procedures in relation to the adoption of servitization.
CHAPTER TWO: LITERATURE REVIEW – SERVITIZATION

2.1 Introduction
This chapter introduces and extensively discusses the concept of servitization. Firstly, it introduces the relationship between sustainability and the Built Environment (BE) which plays an immense role in the changes witnessed in the construction industry. It continues by discussing briefly about the construction industry, its nature (including the characteristics), and the challenges faced by the construction industry. Furthermore, a detailed concept of servitization follows where its evolution, procedure, and benefits are discussed. Later, the chapter, highlights how servitization can be operationalized in the construction industry.

2.2 Sustainability and the Built Environment
The role played by the built environment appears to be significant in sustainable development and as such it became center of attention within the environmental movement. Likewise, the construction industry, a contributor to the state of the built environment, has a significant impact on the natural and built environment (Feige, Wallbaum, and Krank, 2011). An increase in the advocacy by construction clients for the delivery of sustainable built environments has been observed. Extant policies and legislations as well as tax regimes which have been instituted by successive regimes to encourage sustainability tenets have been identified as salient drivers of this advocacy. An example of such policies is the carbon tax initiative. Also, the observed rise in advocacy has been traced to the need for the development and sustenance of a pro-sustainability institutional reputation by construction clients as well as operational effectiveness of buildings-functionality. One such area where the quest for functionality has been buttressed is in energy efficiency across the whole-of-life cycle of the project/asset (Feige et al., 2011).

Construction activities are said to consume an enormous amount of energy, resources that are natural and large amount of water resulting in wastes (Zuo, Read, Pullen, and Shi, 2012). In the whole world, carbon dioxide emissions that are related to the built environment are expected to increase from 8.6 billion tons in 2004 to 11.4 billion tons as as high as 15.6 billion tons by 2030 (Allen and Clarke, 2007). However, emerging technologies and business models has proven that the energy consumption in new constructed buildings and existing buildings can be reduced by a projected 30–50% without escalating costs of investments (Feigie et al., 2011).
In response to the difficulties faced regarding global climate change, strategies to reduce carbon emissions have been acknowledged from the global population (Jones, and Glachant, 2010). In order to mitigate these difficulties faced that result in global climate change, there is a need for understanding low carbon communities of community practices and resultant emissions, as well as the relevant technological strategies, infrastructure and the institutions associated with this aspiration. Reduction in carbon intensity has become one of the common sustainability indicators (Shen et al., 2011).

Feige et al. (2011) highlight that the proportion of delivering buildings that are energy efficient and sustainable still remains low regardless of the clear importance of the building sector in the process of environmental change and the increasing popularity of the research subject of sustainability surrounding the building sector, which is pinpointed by the number of green construction certificates and tools.

2.3 Nature of construction
The construction industry is a very complex, dynamic and fragmented industrial sector (Nasrun, Nawi, Baluch, and Bahauddin, 2014). The construction industry consists of several players at various stages carrying out a diverse range of functions such as planning, design, construction, and maintenance. Researchers revealed that there are numerous problems that were generated by traditional construction project delivery practice and this was due to fragmentation, such as; isolation of professionals, lack of coordination between design and construction because of the sequential manner in which the process of project delivery was executed (Nasrun et al., 2014). Often, this resulted in the delivery of non-functional assets for the construction clients and, dissatisfaction.

This is supported by Arditi, Elhassan, and Toklu, (2002) who add that failure in designing by professional bodies to contemplate how a contractor will construct the failed design can have negative impacts in terms of problems related to scheduling, experiencing delays and other disagreements during the delivery of construction project. More importantly however, when construction is disjointed from planning, design and operations opportunities to reduce schedule failings, improve the functionality of the final product, and reduce costs will be missed. This results in inefficiencies during the construction phase such as increased project complexity, rework, increasing costs and longer construction duration (Sweis, Hammad and Shboul, 2007). As a result
of the aforementioned, the construction industry is being regarded as having challenges with consistency to continue delivering, thus hindering the establishment of operational teams which ultimately resulted in less efficiencies in the project delivery process and delivery of more sustainable (Nasrun et al., 2014). Hence, the manner in which construction requirements are incorporated and manner in which knowledge is paramount at an early stages of the project ultimately leads to an enormous improvement in project performance (Nasrun et al., 2014).

2.3.1 Characteristics of Constructed Assets
It is noticeable that one of the main contributors to the economic growth and development of the nation appears to be the construction industry. While the construction industry is deemed to contribute to the growth of the economy, it has certain characteristics that makes it different and somehow similar to other industries and these characteristics include; increased levels of competition, many conditions that are risk related, and construction clients that are well informed (Mahmood, Mohammad and Hamid, 2017). With regards to the bidding system, the construction industry considers the lowest price most of the time and it leads to a high bargaining power of the clients. In furtherance to this, construction firms in general are encounter challenges when they have to induce the demand for their services and must participate in a bidding process to generate new projects (Polat, 2010).

There are numerous authors that have research the most prevailing characteristics of the construction industry as well as the products offered by the construction industry. Findings highlighted that products offered by the construction industry have five features, namely: immobility, complexity, durability, costliness, and high level of social responsibility (Nam and Tatum, 1988). Kangari (1988) supports the previous author and highlights that since the construction industry is complex, there is a lot of fragmentation and thus, it becomes sensitive to economic transformation, and completion becomes high since there is no clear scope of work to be performed. Arditi et al. (2008) also highlights that the construction industry is more dependent on and influenced by geographical features such as location, landscape, weather, etc.

The construction industry is also characterized by policies which appears to contribute towards complexity. An example of such policies comprises of complex long-term procurement processes in tendering for projects (Zuo et al., 2012). Polat (2010) also mentions that construction products are complex, massive, and their affordability is very high, and can only be offer upon request.
Moreover, contractors experience difficulties when they use past experiences to deliver new project and this is due to the complex nature of the construction industry (Kärnä, 2014).

2.3.2 Challenges faced by the construction industry
Regardless of the prominent spotlight on the construction industry (CI) as a barometer to the economy, the CI faces major challenges which include project overruns, structures with poor quality, inappropriate systems of procurement, and a failure to comply with infrastructure and housing needs, as a resultant of rapid urbanization and the inability to adopt best practices (Blut, Beatty, Evanschitzky and Brock, 2014; Subramani, Sruthi, and Kavitha, 2014). The last two challenges are considered to be the highest due to their noticeable consequences, as discussed below.

- **Rapid urbanization**
  There are few critical factors that have been influential to urbanization and the growth of cities in developing countries. There is an increasing rate in the number of people moving from rural areas to urban areas and result in both negative and positive implications. On the other hand, migration to urban area seem to be improving the standard of living for the migrants, and rapid growth of informal settlements with no or poor basic amenities is the resultant. As such, the migration of labour often result in deterioration of the environment of the countryside and result negatively to its productivity (Harris, 1992; Turunen and Finne, 2014).

- **Transfer of technology and innovative practice**
  Another serious challenge of CI is the inability to adopt (or adapt) established best practices already working in other economic sectors. In short, best practices are most convenient execution work that have shown to be more efficient and effective in providing particular services (Abbott, 1985). Having moved from rapid urbanization and the inability to adopt best practices which might be outdated, it has been identified that the environment and other sustainability-related issues are one of the top issues that the construction industry is facing (Ade, Aftab, Ismail, Sasitharan, Qadir, 2012). The shift to sustainability is a new paradigm where sustainable development objectives are sought for within the building design and construction industry. Other issues experienced in construction projects include construction waste, excessive resources consumption, adverse effect on the environment, time and cost overrun (Ade et al., 2012).
• **Construction Waste**

Waste is a serious problem in construction projects as it has a direct impact on the degree of productivity, material loss and completion time of projects as well as project cost. The amount of waste contributes about 30-35% of a project’s production cost (Bennett, 2003). The amount of materials wasted on construction sites is comparatively high and amounts to 9% by weight of the materials purchased as identified in the research study of material waste generated in a Dutch construction project (Bennett, 2003). Therefore, it is more effective to adopt a systematic and a strategy of waste management that is more efficient which will reduce waste generation at various levels. Advanced techniques such as lean construction can help in reducing waste at source and can minimize the waste produced during the operation by re-using and re-cycling (Sacks, Koskela, Dave, and Owen, 2009).

• **Excessive Resource Consumption**

The built environment has significant impact on resources where it accounts for one-sixth of the withdrawals of freshwater in the world, a quarter wood harvest in the built environment and two-fifths of its material and energy flows. Buildings constructed without taking any consideration to energy, environmental impacts and conservation of natural resources will result in detrimental wastage affecting the ecological integrity (Bal, Bryde, Fearon, and Ochieng, 2013). Excessive use of resources, energy and an increasing demand for raw materials are largely often result in depletion of natural resources in the globe and contribution towards global warming (Bal et al., 2013).

• **Adverse Impacts to Environment**

Activities within the construction industry are duly considered as being environmentally unfriendly because of the vast amounts of natural resources they consume, and the capacity of these activities to produce a great deal of pollutants. The construction industry has extensive and identifiable impacts on the environment. The emission of carbon dioxide by buildings contributes to the global warming and extreme weather changes in the entire world (Tan et al., 2011). For instance, timber harvest, leads to the loss of natural forests. As such, quarrying to provide aggregates, production of cement, the wasteful use of water and the widespread use of toxic chemicals in materials are other impacts of constructing a new building.

• **Construction Schedule Delays**
Construction industry is considered as an industry driven by schedules and one basic requirement for success of project is completing the project within the scheduled duration or time frame. Even though completing the project within the given duration is a pre-requisite in the construction, it still appears rarely for projects to be completed within scheduled time and this does not only occur in local projects, but a problem faced worldwide in the construction industry. Time delays can be due to one or more reasons including problems of financing and payment for completed works, poor contract management and shortage of materials, design changes, and weather conditions among others (Tarek, Mohamed, and Kassab, 2011).

- **Excessive Budget**

  Achieving project completion within budget is a major criterion for project success. But unfortunately, most of the projects fail to achieve project completion within the estimated budget. One of the major problems the developing and developed countries is noticeably budget overrun. This trend of budget overrun occurs more in developing countries where in worst cases the overruns sometimes exceeds 100% of the budgeted cost of the project (Hwang and Ng, 2013). There are number of factors that contribute towards cost overrun which includes lack of contractor’s experience, poor management of site and supervision, incorrect time and cost estimates, delay in schedules, changes in design, variability in prices of materials, cash flow and financial constrains faced by contractors (Hwang and Ng, 2013).

### 2.4 Servitization

**2.4.1 Definition from different sectors**

Vandermerwe and Rada (1988) consider servitization as a concept adopted by companies which are consciously seeking to develop service offerings to support their products to gain competitive advantage. By adding services to products supplied, firms distinguish their offering from competitors, increasing customer loyalty and competitive advantage. This research study examines servitization as the transition by manufacturing companies towards offering goods accompanied services rather than goods alone (Neely, 2008). Servitization is considered an overarching concept that includes but goes beyond service infusion, and is defined as the process of transiting from a product-orientated business model and logic to a service-centric approach (Ahamed, Inohara, and Kamoshida, 2013).

To varying degrees, servitization involves a redeployment and reconfiguration of a company's resource base and organizational capabilities and structures (Baines, and Lightfoot, 2011). In the
music industry, servitization is defined as an increment of customer market package that focuses on blending products, services and knowledge that is offered by a firm with the aim to create more value from firm traditional product offerings. An increased service offers also expose manufacturers to opportunities that are related to gathering more data from their clients, particularly in relation to the products that clients purchase from them (Myrthianos, Vendrell-Herrero, Parry and Bustinza, 2014).

2.4.2 Evolution of servitization in the construction industry
Since the late 1980s, its adoption as a competitive manufacturing technique has been considered by scholars who have particularly looked to comprehend the advancement and consequences of this idea (Wise and Baumgartner, 1999, Oliva and Kallenberg, 2003, Slack, 2005). A developing enthusiasm for this theme by the scholarly community, business and government has been buttressed (Hewitt, 2002). But a lot of this enthusiasm depends on the conviction that a move towards servitization will create extra value-adding capacities for conventional manufacturers.

Manufacturing companies have been selling services for quite some time. However, managers have been perceiving services as a necessary aspect in the context of strategies used for marketing in a traditional way (Wise and Baumgartner, 1999; Gebauer et al., 2005; Gebauer et al., 2006). In this case, the main aspect of co-creation of value was considered to stem from tangible goods, and services were anticipated solely as addition to products (Gebauer and Friedli, 2005; Gebauer et al., 2005). From this initiative, there has now been a gradual change in the way services are produced and marketed by manufacturing companies.

The main distinguishing factor in the whole integration of products and services offering is the provision of services which has now gained much interest for consideration as an explicit strategy. At the present moment, services are included as fundamental value-added activity for value proposition (e.g. Vandermerwe and Rada, 1988; Quinn et al., 1990; Gebauer et al., 2006) and thus, reduces the product to be just a part of the offering (Oliva and Kallenberg, 2003; Gebauer et al., 2006). Moreover, this is found to be the most effective way for exposure to future business ventures by some companies (Wise and Baumgartner, 1999). The figure below depicts the added value from the P-S (Product -Service) providers’ perspective (Prabhu, Taisch, and Kiritsis, 2013).
Hytönen (2005) argues that many of products offered by the markets comprise of both products and services, but with greater emphasis on the product offered. A few authors propose that manufacturing companies incorporate services among their principal offers (Savvy and Baumgartner, 1999; Brax, 2005; Mathieu, 2001). As indicated by Sawhney et al. (2004), manufacturers can discover new business openings by adding services to their chain, completing exercises previously done by the client or presenting adjoining chains.

As indicated by Brax (2005), to increase the value of the primary chains, services can be joined with substantial products to separate them from contending products. Further, a few motivations for the incorporation of services into organization’s product offerings like the extension of association with clients, making open doors for construction in advanced markets, adjusting the monetary cycles with various money streams have been observed (Allen and Clarke, 2007).

2.4.3 Procedure for adoption of servitization in the construction industry
Traditionally, contractors have focused their consideration mainly on the design and construction of built assets. While they were typically required to provide services to an extent in relation to operation and sustenance facets, these service assurances were considered as backups to their design and construction obligations. There was a tendency to view these service practices as ordinary, responsive and scheduled; hence, organizations ignored the potential value they could offer their business (Johnstone et al., 2009). Organizations would offer added services (warranties, etc.) free just to secure a product deal or deliver layers of services that did not really address the client's needs (Anderson and Narus, 1995).

These changing attitudes towards product and services are embodied influentially in the challenge posed by Vargo and Lusch (2004) to scholars and experts to move towards a service-prevailing rationale, the idea of contention being that suppliers must co-create value through-existence with
their clients. Prahalad and Ramansay (2004) declares that the value co-creation process increasingly lies outside the suppliers’ hierarchical limit, lying in the connections between a system of inner and outer on-screen characters. The driver for this developing rationale has been a recent pattern in product-orientated associations moving from product deliverance towards the establishment of incorporated blends of products and services that deliver value being used (Baines et al., 2007).

2.4.4 Benefits of adopting servitization

The projected benefits of servitization adoption are clearly pointed out in the literature, including more stable and increased revenues, higher growth rates and superior long-term profitability (Smith et al., 2014). It has been argued for manufacturing companies to achieve competitive advantage will depend on the presence of economies of scale in services, and economies of scope in products and services (Teece, 2010), while efficient complementarities between centric products and additional services have potential to benefit to customers by reducing procurement costs and information asymmetries (Visnjic and Van Looy, 2013). The implementation of servitization in manufacturing companies is likely to create strategic benefits. According to the discussion above a company makes a value proposition to the customer, who therefore benefits by co-creation, which finally is manifested in some kind of service that is likely to result customer satisfactions and whole life value is created (Vargo and Lusch, 2004; Kryvinska et al., 2014).

Other few authors highlight the benefits that comes with adoption of servitization that are related to financial gains that are ultimately shapes by a company’s pricing strategy, the potential in adding value in manufacturing, as well as the potential of gaining competitive advantage in the markets (Aho, 2013; Kryvinska et al., 2014). In addition, the creation of products that are service-orientated requires an insight understanding of customer needs, which is best achieved by improving customer relationship and gaining knowledge of how the products are being used (Walters, 2008). The proposed benefits for manufacturers include stable cash flows from the maintenance revenues and increased profit, (Laine, Paranko, and Suomala, 2012). A servitization strategy might be utilized to build and maintain a competitive advantage, even in the long run. Adding service components to tangible goods also offers an ample opportunity to influence decisions of customers when buying, which brings about new marketing benefits and, in future, repeat sales and maintain good customer relationships. This could only be achieved by offering coveted complete solutions rather than typical after sales services (Rymaszewska et al., 2017).
2.5 Operationalization of Servitization in construction
Patterns similar to the concept of servitization seem to have evolved within the construction industry if the private finance initiative (PFI) projects is considered. The PFI arrangement challenges contractors to adopt a more holistic strategy towards the design, construction, commissioning, operations, maintenance and post-occupancy of buildings with overt concentration on the provision of services (Akintoye et al., 2003).

According to Brady et al. (2005) there are possibilities for servitized business models within the construction and infrastructure subdivision, as they examined expanding provision of “integrated solutions” which consolidate products and services to address a client's necessities over the life-cycle of the project. Studies centered on the advancement of “integrated solutions” literature centers overwhelmingly around the provision of PPP/PFI projects (Johnstone et al., 2009; Storbacka, 2011; and Roerich and Caldwell, 2012;).

Yet not a lot of studies appear to have been conducted in exploring not just the utility of servitized business models to construction clients and contracting companies but also on the probable factors influencing the adoption of this business model by these aforementioned entities. This is particularly the case in the South African construction industry context, thus forming the rationale for this study.

2.6 Chapter Summary and link
Construction is considered to be sustainable when it overcomes environmental challenges, and take action towards social and cultural demands and delivers improvement towards the economy. The fundamental concept of sustainable construction is to deliver affordability in the long-run, quality and efficiency, co-creation of value to clients and users, while on the other hand reducing negative impacts related to the environment and striving to increase economic sustainability (Hwang and Ng, 2013). In furtherance, for construction to be considered sustainable it requires the development of enlightened institutions and infrastructures, appropriate management of risks and doubts and knowledge acquisition to assure intergenerational equity and conservation of the ability of earth’s natural systems to serve humankind.

This chapter highlighted the critical aspects of the nature of construction industry, the evolution and procedure of servitization, and again, challenges that are faced which may hinder with the adoption of servitization. Apart from all the evolution, procedures of adopting servitization, and
challenges experienced, this chapter also highlighted the potential benefits that comes with adoption of servitization. Briefly, servitization concept is keen to bring about sustainability and co-creation of value to meet the client’s needs and as a result, adoption of servitization can be considered as a stepping stone to deliver satisfaction, efficiency, and ultimately bring whole life value (Kohtamaki and Partanen, 2016). The next chapter comprises of the cross-sectional literature of servitization from different industries that have a very close relationship with the construction industry.
CHAPTER THREE: LITERATURE REVIEW – CROSS SECTIONAL

3.1 Introduction
This chapter introduces study of servitization in different sectors through review of literature. This chapter aims at reviewing the process of servitization in different sectors of interest, the drivers towards servitization, challenges faced in those sectors, opportunities and benefits that servitization can bring. The main reason for this compression study was to identify the similarities and dissimilarities from these sectors and compare if there is any similarities and dissimilarities as it pertains to the adoption of servitization.

3.2 Servitization in Manufacturing
3.2.1 Process of servitization in the manufacturing industry
The concept of servitization is a term that is very common in the manufacturing industry and accordingly, it deals with goods and products. According to Vandermerwe and Rada (1988), Modern corporations are willing to offer full market packages of customer-focused blends of goods, services, support, self-service and knowledge. But services are beginning to dominate in this regard and as such this transition is termed the servitization of business.

Accordingly, during pre-sale within the manufacturing process, it is classified as product-service integration, where services are linked to products during the product development phases. In this manner, these inputs throughout the production process, concerning characteristics as well as physical composition of the product itself, are usually client-driven and therefore summarized as customization (Marceau and Martinez, 2002). The concept of providing services by reason of vertical integration is very common in the manufacturing industry and finally described as integration oriented product-service system (PSS), which was added by to the initial approach (Neely, 2008). Figure 2 below shows how PSS came about.
Figure 2: Evolution of Product Service System Concept. Source: (Bains et al., 2007)

Services can be classified regarding the degree of customization in relation to its integration and as such it is important to acquire knowledge and understand value perceptions of customers (Tukker, 2004). Moreover, strategies of servitization can be consolidated to five options, consisting of integration-oriented, product-oriented, service-oriented, use-oriented and result oriented product-service-systems. Finally, these options of servitization describe the transition from a pure manufacturing company to a service provider (Tukker, 2004).

Figure 3 below illustrates how markets came up with the underlying strategy to substitute the subsequent and single offerings by integrating value adding solutions which lead to lasting relationships to closely link providers and customers (Schuh, Gudergan, Feige, Buschmeyer, and Krechtin, 2015).
3.2.2 Drivers of servitization in the manufacturing industry

Manufacturing companies are transiting from being pure manufacturers of goods to offering a blend of solutions and services (Neely, 2009). Requirements for acquiring knowledge and develop service capabilities is key in this aspect (Gebauer, Fleisch, and Friedli 2005; Baines et al., 2009a). Research and existing literature propose that manufacturing companies transiting towards servitization encounter several challenges that generate inconsistencies, e.g. among strategic intentions, internal and external organisational arrangements and in customer relationships (Alghisi and Saccani, 2015). These inconsistencies may hinder in attaining the expected benefits of servitization, leading to ‘service paradox’ (Neely, 2009; Gebauer, et al., 2005).

Regardless of the prevailing motivation behind adoption of servitization by manufacturers resulting in financial, marketing or strategic, servitization stresses on a change in the strategic vision of product-oriented companies that can be proficient only in the long term (Baines et al., 2009b). Servitization emphasizes the service elements in a manufacturer’s offer (Gebauer, 2008) and this often happens incrementally, by progressively exploiting the service potential in different areas (Oliva and Kallenberg 2003; Paiola et al., 2013).
Although the concept of servitization deals with services exclusively, its origin and motivation arises from the manufacturing industry, since these services are augmented elements of the tangible product offering. The main goal of shifting from product-centric to product-service delivery was to co-create value with the customers in order to gain benefits by enriching its product offers with services (Kryvinska, et al., 2014). The concept of servitization appears to be driven by aspects by general business environment and market aspects, like e.g., low profit margins and revenues in manufacturing industries, and whilst others by internal drivers concerning financial, strategic and marketing aspects (Falk and Peng, 2013). Furthermore, higher margins on services attract financial consideration whilst the competitive advantage resulting from variation drives strategic aspects. Endmost, market related issues are supported since servitization is the driver of sales and tightens relationships resulting in a customer satisfaction and loyalty (Falk and Peng, 2013).

3.2.3 Challenges of servitization faced in the manufacturing industry
A shift from products to services involves major challenges in management challenges, since services require organizational principles, structures and new processes to a product manufacturer (Alghisi and Saccani, 2015). Areas where challenges are faced by manufacturing companies during while transiting towards servitization include:

- Leadership commitment
- Risks
- Strategic vision
- Critical mass
- Customer or supplier capabilities
- Development of service capabilities and methods
- Timescale
- Organizational readiness
- Co-production
- Integration capabilities
- Communication and training
- Good-intensive brand
- Supplier competition
• Knowledge management
• Sourcing decisions

3.2.4 Opportunities that comes with adoption of servitization in the manufacturing industry
Opportunities of servitization are different from in every firm, mostly importantly according to the firm’s position in the value chain. In the case of Systems integrators, they design and deliver complex systems that incorporate multiple products and may underpin whole functions within their customers’ businesses (Brady, Davies, and Gann 2005). As such, the firms are placed in a pivotal position in the value chain, as they integrate products from other companies and sell them to customers as part of their systems. From this point of view, these firms have an exceptional opportunity to implement service-oriented offerings because customers are bound to will redistribute the risks and duties related with these perplexing frameworks, rather than a solitary segment or independent item (Robinson, Chan, and Lau, 2016).

However, there are challenges appearing that are related substantial costs and complexities due to management of multiple products and services related components across suppliers and clients and as result it becomes difficult to undertake. In addition to this, organizations center their focus around institutionalizing different components of more extensive contributions so they can offer them to more clients. These organizations benefit from new open doors related with institutionalization (Suarez et al., 2013). There are additionally opportunities to reach past customary research networks, to participate in multidisciplinary, interdisciplinary, and transdisciplinary examine activities to improve the extent of servitized business models (Kowalkowski et al., 2015).

3.2.5 Benefits of servitization in the manufacturing industry
Adopting servitized business models comes with number of benefits for businesses. Firstly, the capacity of the business to meet clients’ requests, consequently driving at last to more prominent dimensions of client retention. As such, this draws attention to businesses that deliver of products only are not enough to sustain the demands of clients. Clients are now pleading to those who are meant to deliver to meet with their requirements and offering additional services that will ultimately be in alignment with their demands (Myrthianos et al., 2014). Other than the financial related benefits, the transition towards adoption of servitization in a manufacturing companies are likely to create strategic benefits. Furthermore, the variation of offerings carried out by the
manufacturing companies appear to be manifested by competitive advantage. Thusly, a few research studies identified the addition of services as the standout factor amongst the most basic and successful focused factors in manufacturing, as they considerably cultivate, support and increment industry hindrances at an entry level (Kryvinska et al., 2014). It is therefore a need that these services ought to straightforwardly improve value of the related products as opposed to being of basic and general nature.

The discussion above points out that the manifestation of services offered by a company are likely to bring value proposition to clients and as a results clients also likely to be exposed and attain benefits by co-creation (Kryvinska et al., 2014). The authors continue and mention that there are certain transformations of value that has to take place in order to provide the fundamental basis for the final act of value co-creation and these transformations include: (a) transformation of materials and equipment that is been led by manufacturing, repair or installation throughout the supply chain (b) transformation of information which is likely to include design or analysis through management of knowledge, and (c) transformation of people which training and relationship establishment are the main core aspects.

3.3 Servitization in HealthCare

3.3.1 Process of servitization in the healthcare industry

The healthcare sector is frequently mentioned in product service system (PSS) research as one of the areas where the blending of physical products and services appears to offer incredible open door for advancement and enhancement (Mittermeyer, Njuguna, and Alcock., 2011). In furtherance, Mittermeyer et al. (2011) highlight that there is complexity in the whole network of actors in the healthcare sector and it is due to rapid increase of knowledge and diagnosis as well as treatment that gets more and more patient specific. It also appears that the healthcare sector is experiencing the need and trends towards servitization which other sectors also faced.

Along these lines, it is profoundly essential to comprehend the advancing business forms happening in healthcare environments prior to the development of cloud and smart items infrastructure. Whilst on the other side there is a need understand the core technical potentials and a need to know what is in order to create an architectural approach for smart healthcare (Kuo, 2011; Vladimir, Ahmed, Sarfaraz, Johannes, and Gerrit., 2015). Furthermore, with regard to cloud computing and smart devices, wireless sensors can easily be deployed in any environment and at
any convenient time the data can be collected and saved from these wireless sensors. While there is a need for meeting the needs and demands of clients that are associated with healthcare, it appears that smart devices are developing at a very fast speed in health monitoring aimed at meeting those needs and demands of clients (Vladimir et al., 2015). Vladimir et al. (2015) further highlights this transition centers around various features for a mobile healthcare system and with the help of mobile devices it becomes easier collect physiological signals such as body temperature, pulse rate, etc.

As soon as the data collection is stage completed, the information is then conveyed through WiFi or another compatible system network which on the later stage it be stored, synchronized, and shared on a server. The next step will be a continuous diagnosis of health symptoms and these data collected will then be put together and accessed with a cloud service making it easier health professionals to analyze the data and find mitigations to treat the patient from the findings analyzed from the collected data (Dzombeta, Stantchev, Colomo-Palacios, Brandis, and Haufe, 2014). Despite the lack of academic research, some of the well-known medical device companies like General Electric Medical Systems were keen to adopt PSS concepts at an early stage of transition (Mittermeyer et al., 2011).

### 3.3.2 Drivers of servitization in the healthcare industry

Consideration for continually gathering information about how healthcare can be sustained as it is often implemented in PSS, and by taking into account clients feedback, then quality and efficiency of medical devices can be enhanced in this sector (Mittermeyer et al., 2011). Product service systems are likely to result in the establishment of new segments in the market by offering custom-made solutions to meet their needs and demands (Vladimir et al., 2015). The moment there is a need to changes in markets; such PSS are likely to be modified to meet new customer needs. However, the readiness to adopt new healthcare procedures, technologies and services may significantly be reduced by a risk-adverse behaviour of each of the actors (Mittermeyer et al., 2011).

Product Service Systems in healthcare appears to have not been the key interest in the focus of PSS research in the past, yet the concept of servitizing holds great potential to address major challenges in the healthcare sector. The cost pressures resulting from globalization also appears to be a solemn threat to the healthcare sector (Mittermeyer et al., 2011). In the process of transition,
PSS has become a convenient and efficient tool for reducing costs and usage of resource while at the time maximizing the outcome for co-creation of whole life value to clients. Capitalization on knowledge can be used by companies during the research and development process of a product that is required by clients, by selling this knowledge in separate services offered (Vladimir et al., 2015).

In furtherance to the selling of knowledge in different services, products may still be reused in blending them with various services. This appears to be more evident for software products, which can easily be recombined with services to provide additional benefit for a customer group or to exploit new markets (Baines et al., 2007). Due the need for specialization in medical healthcare and increased complexity of technology, integration of technologies, products and services becomes a center of attraction for delivering of new service components expected by clients. As a result, there is a need for products and information to be available at the right point and meeting quality requirements during more complex clinical workflows (Mittermeyer et al., 2011).

3.3.3 Challenges of servitization faced in the healthcare industry

The combination of services and existing healthcare devices/products can serve as an underlying model for innovative provision models in healthcare which also reflects a clear concept of servitization. Another important precondition is the implementation of proper governance models for these infrastructures. Due to the specifics of the processed data – detailed information about health status, vital parameters and their historical trends - healthcare applications are particularly challenging with respect to data privacy and information security. This can be of particular relevance for healthcare, due to the complex requirements regarding data privacy and information security (Dzombeta, Stantchev, Colomo-Palacios, Brandis, and Haufe, 2014).

As costs and demand for healthcare services rise, access to care is becoming more challenging globally. Many healthcare systems have also been reported to have demand versus capacity issues that are extending wait times for care services, and in many cases deny access (Heisler, 2013). With the cost of healthcare globally that is increasing rapidly, consequently it is believed that the sustainability of healthcare systems worldwide is threatened, and the affordability of care is near impossible (Deloitte, 2014). While almost all countries around the globe are continuing in their efforts to improve the quality of healthcare, healthcare organization are struggling to reduce or
contain the rising cost which has become a global phenomenon, and even more vulnerable since
the 2008 global recession (Atallah et al., 2012; Mohrman et al., 2012).

Most of the smart items available in the healthcare sector can be utilized in stationary care
scenarios as well. Due to cost pressure, hospitals as well as intensive care units or other patient
care facilities, are facing challenges like less financial resources (Arhete and Erasmus, 2016). As
a result, reduction of labor cost becomes the critical criterion for the implementation of smart items
infrastructure in a stationary setting (Vladimire et al., 2015). The transformation towards service
 provision is a complicated process requiring certain level of accuracy and precision in each of the
stages involved. A number of different examples from the healthcare industry have shown the need
for further understanding of the establishment and ongoing improvement of product-service
solutions (Velikanov, Macintyre, McMahon, Naybour, Arkle, Angelis, 2012). Hence, data
concerning possible service utilization by the end user should be considered, as well as additional
characteristics measured during the performance phase (Velikanov et al., 2012).

3.3.4 **Opportunities that comes with adoption of servitization in the healthcare industry**
Companies may create more value to clients through establishment of appropriate combination of
product-service or standalone services that are likely to fulfill the needs of a client than just pure
product offering and this can be done through service orientation strategies. Additionally, because
of service impalpability and work constancy established product-service solutions might be more
hard to sensibly duplicate and along these lines give the occupant firm a competitive advantage
(Kryvinska et al., 2014; Vandermerwe and Rada, 1988).

When it comes to implementation of servitization strategies, the is a need to develop the
relationship between the service provider and its clients so that an understanding of the key
requirements can be better understood and integrated into the value creation process (Vladimirova,
Evans, Martinez, Kingston, 2011). Moving from debates on variances between services and
products, recent designations appear to be more externally oriented with a stronger focus on clients
(Vargo and Lusch, 2008). Numerous product-service organizations have as of late attracted their
regard for service offering notwithstanding existing product offering. Baines et al. (2007) classifies
such combination of product and service solutions aimed at a final result rather than pure service
or product realization as Product Service Systems (PSS).
Tukker (2004) expands on the categorization of various product-service solutions into three groups: product-oriented; user-oriented; and results-oriented. Following these categories, those who are meant to provide may have a choice that relates to the extent of service integration to their pure product that they offer. As a result, product competencies that clients are willing to pay for that are provided by companies are based on competitive variation strategy that offers unique products (Velikanov, Macintyre, and Angelis, 2013). Be that as it may, as supported by Smith and Ng (2014), PSS is thoughtfully product-orientated or activity of focus that looks for adding product value through the establishment of related services.

3.3.5 Benefits of servitization in the healthcare industry

An unmistakable benefit of PSS in the healthcare sector is the expedient relationship to the client. A close relationship between, for example, a designer of medical devices and the client which in this case can be a physician - probably focused on certain specialties, for example, neurosurgery - faces fundamental difficulties due to the different knowledge background of actors and the different terminologies (Mittermeyer et al., 2011). A well-defined PSS, including a close relationship between developer and customer, facilitates the knowledge transfer and constantly improves the communication between these groups. This ultimately will improve the quality of the provided PSS (Kryvinska et al., 2014).

Added services increase the trust in utilizing new technologies and in this way PSS can achieve a specific edge of security in opening a market, while an inventive product all alone may not achieve this dimension of client acceptance (Laine et al., 2012). From PSS supplier perspective, this reduces financial dangers related with innovative advancements, since the blend of products and services may improve the market entrance and increment the client base (Mittermeyer et al., 2011).

Likewise, knowledge made amid the improvement procedure can be sold as consulting and training services prompting expanded income yet in addition making extra value for the client. Once on the market PSS can increase market acceptance compared to a product without supplementary services (Velikanov et al., 2013). Therefore, the launch of a PSS in the markets can lead to a broader base of potential customers, for example if services are offered that educate customers in using a product that usually would just be used by a small group of experts. Additionally, the market penetration can be increased, if services and products are designed for an easier user adoption (Mittermeyer et al., 2011).
3.4 Servitization in Automotive Industry

3.4.1 Process of servitization in the automotive industry
A wide range of characterizations and meanings of service-orientated strategies can be found in studies concerning the Automotive industry, with respect to servitization (Vandermerwe and Rada, 1988), servitizing (Rothenberg, 2007), PSS (Tukker and Tischner, 2006), useful deals (Markeset and Kumar, 2005), full-service contracts (Stremersch, Wuyts, and Frambach, 2001) and so on. Moreover, PSS can potentially bring changes in production and utilization which may quicken the move towards more sustainable practices (Mont, 2002).

It is noticeable within the aerospace sector that engine suppliers, for example, Rolls-Royce does not just manufacture engines, but rather gives through-life support to their engines and lease the usage of their engines dependent on a "Power by the hour" arrangement (Smith, 2013). On the other hand, the applicability of cross-industry development must be treated with alert (Enkel and Gassmann, 2010). There are doubts with regards to the development of the Rolls-Royce Total Care Model, and comparable innovations from other engine manufacturers within the aerospace division as to the ability of the production network in building construction to play a more effective part in the operation and maintenance of building frameworks after delivery.

Be that as it may, even before Rolls-Royce changed its plan of action, leading to the adoption of "power by the hour" arrangement, the firm used to offer product extras, repairs, and upgrade services (Waters, 2009). Smith (2013) utilized effective servitization techniques of an engine supplier in the aerospace markets to highlight the role played by advances in digitalization, product reliability, monitoring of real-time product system performance and technological intelligence in transforming existing dynamics in the market for maintenance activities. Innovative progressions in product design and manufactures designates now and again that the product supply chain is presently better situated to deliver supplementary maintenance than conventional maintenance and repair associations.

3.4.2 Drivers of servitization in the automotive industry
Studies recommends three elements that drive organizations to seek a servitization strategy and these strategies appear to be financial, strategic and marketing (Gebauer et al., 2005; Gebauer et al., 2006; Gebauer and Fleisch, 2007). These studies point out that the main financial drivers are related to higher profit margin and stability of income (Wise and Baumgartner, 1999; Gebauer et
al., 2005; Baines, and Lightfoot, 2013). Studies also highlights that manufacturers with high installed product bases (e.g. aerospace, locomotives, and automotives) are likely to get service revenues which can be one or two orders of magnitude greater than new product sale (Wise and Baumgartner, 1999; Baines et al., 2009).

Baines et al. (2009) agrees, and points out that in these sectors higher revenue potential often exists. Likewise, Sawhney (2004) identifies companies that have enjoyed success with this approach and achieved stable revenues from services despite significant drops in sales. Baines et al. (2009) later emphasise that most significant revenues are pushed downstream towards in-service support and this is due to the increased life-cycle of many modern complex products such as aircrafts. The combination of product-service appears to be less sensitive to price based competition, and so appears to provide higher levels of profitability when comparing to offering of physical product alone (Baines et al., 2009). At long last, product-service deals appear to be more impervious to the economic cycles that affect investment and product purchases (Oliva and Kallenberg, 2003). As such, this helps with securing income that is consistant and balance the effects of mature markets and unfavourable economic cycles (Baines et al., 2009).

The literature every now and again alludes to drivers that are mainly concerned with attainment competitive advantage as a strategic driver. Competitive advantage is achieved when service elements used to set apart manufacturing offerings and so provide important competitive opportunities (Baines et al., 2009). Competitive advantage achieved through services are often more sustainable since, being less visible and more labour dependent, services are more difficult to imitate (Baines et al., 2009). While examining these perspectives Frambach et al. (1997) highlighted that the value-add of services can be a way of delivering value to clients up to a point where pure and physical products are perceived as servitized.

### 3.4.3 Challenges of servitization faced in the automotive industry

The adoption of a servitization strategy comes with it major challenges that are of cultural and corporate and they can generally be categorized into integrated product-service design, organizational strategy and organizational (Baines et al., 2009). The author continues and highlights that there is uncertainty regarding services which brings difficulties to define and this is due to the fact that by nature the design of services varies from the design products. As such, this may demoralize organizations from extending the service aspect, especially on the grounds
that they have to assess competition outside the typical space from sudden opponents including their own suppliers, wholesalers, and clients (Vandermerwe and Rada, 1988; Mathieu, 2001; Oliva and Kallenberg 2003). When performing activities that where done in the past by clients, risk also needs to be considered in the design process as it may pose new challenges (Slack, 2005). In this case, marginal risk experienced in the past might outweigh the benefits of increased profit potential in the future.

One of the key elements of value proposition to clients is deemed to be communication and as such communication strategies must be centric and clearly described and clients need to be considered in the design of service provision (Baines et al., 2009). Furthermore, adapting to necessary organisational structures and processes is key if a company takes a decision of transiting towards service-oriented products. This is because, there are difficulties in defining the organisation strategy necessary to support the customer allegiance required to deliver a combination of product and services (Baines and Lightfoot, 2011). In instances where organisations are keen to offer services orientated and value services such as provision of installed base services, then it is best that the organization adopts a downstream position (Oliva and Kallenberg, 2003). Such organizations offer solutions through a blend of product-service and their focus is on clients while offering products that meet the needs and the demands of the clients (Baines et al., 2007).

3.4.4 Opportunities that comes with adoption of servitization in the automotive industry
A key element of servitization strategies is focusing much on the client. It appears that clients do not only require products but products that are accompanied by services as a way of meeting clients’ needs and co-creating value (Miller et al., 2002, Davies, 2004). Thus, desired outcomes for customers are delivered even if this requires the combination of products from other vendors (Baines et al., 2009). This utilization of multi-selling of products to offer client driven solutions is exemplified by Alstom's support, redesign and operation of trains and flagging systems. Oliva and Kallenberg (2003) take into consideration that strategy of client orientation to consist of two separate elements. The first element of this client orientation appears as a transition of the service offering from product-oriented services to client’s developments oriented services and the second element appear to be a transition how client interact from transaction-based to relationship-based.
Opportunities that are related to marketing are generally understood as selling more products through the use of services that accompanies those products. The service component known for its potentials to influence the client purchasing decision and it is noticeable that there has been a lasting tradition in marketing literature due to assessing the importance of service components (Gebauer and Fleisch, 2007; Baines et al., 2009). This is evident in the industrial markets where customers are described as increasingly demanding for services (e.g. Vandermerwe and Rada, 1988; Oliva and Kallenberg, 2003; Auramo and Ala-Risku, 2005; Slack, 2005; Baines et al., 2009).

Motives behind transition towards servitization is due to pressures to create more firms that are flexible with regards to responding to client’s needs. Moreover, the need to understand and make the definitions of core competences as narrow as possible and without ignoring the complexity of high technological demand is key, and as a result these leads to outsourcing of services to be pressurized (Baines et al., 2009). Again, services are also deemed to create loyalty to clients to an extent where the clients can fully rely on the supplier for services (Vandermerwe and Rada, 1988; Ojasalo, 2007; Baines et al., 2009). In offering services, companies become more aware of what the clients require and as a result they can develop more tailored offerings to their clients.

3.4.5 Benefits of servitization in the automotive industry

One of the aims of servitization is for companies to provide solutions through collaborations and partnerships with suppliers and deliver greater value to their clients. Likewise, partnering to deliver greater value to clients can pose an impression that companies needs to collaborate with their potential competitors. Yet, the potential benefits if companies consider the idea of collaboration can include the sharing of risk, provision of skills in the services area, gaining competitive advantage through innovation, and finding ways to moderate the political cost caused by transition towards servitizing (Lockett, Johnson, Evans, and Bastl, 2011). Furthermore, these benefits can be grouped into three categories namely:

Benefits related to revenue enhancement

- Additional sources of revenue
- Sources of revenue that are stable
- Higher margins of services
Benefits related to value enhancing

- Allows a better understanding of client needs
- Allows establishment and maintenance
- Better relationships with clients over the product life-cycle
- Allows more comprehensive solutions to client needs
- Improvement in after-sales service
- Offers transparency of life-cycle costs for the client

Benefits related to sustainable competitive advantage

- Service is a differentiating factor amongst companies
- Services are more difficult to copy
- Facilitates customer security/loyalty
- Product-service packages can enable the flow of innovations.

3.5 Servitization in Construction

3.5.1 Process of adopting servitization in the construction industry
Servitization evolved from the notion that clients stand to benefit from products when they are complemented by services which ultimately deliver value-in-use to the end-user (Vargo and Lusch, 2004, 2008). Clients are demanding for added value bothering on “Green” and “Sustainability” features while on the other hand, the government and corporate clients are looking for ways to deliver buildings that are more energy efficient. However, these clients appear to be purchasing products that have no value-added services. Servitization includes the construction of an association's abilities and procedures with the goal that it can better make common incentive through a move from selling product to offering Product-Service Systems (Prabhu, Taisch, and Kiritsis, 2013). However, it remains to be seen how the South African construction industry can modify their product delivery approaches to attend to the growing demands of clients through the incorporation of services as is the case in sectors described previously.

3.5.2 Drivers of servitization in the construction industry
Companies are increasingly to commit to the disclosure of their organization’s commitment and progress towards delivery of products that are more sustainable, efficient to use, and that brings value to the end users. This brings about the need for a change in the mode of product delivery and
engagement with the client’s business case. Servitization has been identified as one of such new modes of engagement which has evidently worked in the construction industry and other economic spheres of endeavour (Baines and Lightfoot, 2011). Kolk (2004) also highlighted that sustainability in the construction industry is considered to add value to the end-users and to a firm from the perspective of various stakeholders and contributes to the future growth of the company and brings clients satisfaction.

3.5.3 Challenges faced in the adoption of servitization in the construction industry
The studies showed that a significant number of servitizing firms were attempting to receive the financial related benefits publicized by past authors (Kowalkowski et al., 2015; Kryvinska et al., 2014). This connects with a noticeable change in the recent tone of the servitization literature which tends to concentrate more vigorously on the difficulties related with making the progress towards more servitized provisions. The degree to which expanded innovation in building energy performance administrative structures will trigger servitized conduct from construction contractors will be reliant on the attractiveness of the agreed payment mechanisms (Raja et al., 2013).

Without contractors having absolute control of energy supply and use, finding a quantifiable output from which contractor performance can be precisely judged remains a key challenge (Gruneberg and Hughes, 2011). Furthermore, poor communication flow and nature of contractual arrangements which foster further fragmentation as well as lack of clear service-orientated strategies posed as probable barriers to the adoption of servitization in the construction industry, judging from the experiences in similar transition in the manufacturing context (Aho, 2013).

3.5.4 Benefits of servitization in the construction industry
While early adopters of servitization were essentially attracted to co-creation of value by delivering products that are service-orientated, benefits that services offer to products, most notably increased customer loyalty and competitive advantage. Furthermore, growth opportunities represent one of the most evident motivating factors for a construction firm to servitize (Hatzakis et al., 2010; Smith et al., 2014). Given the readily available demand and the fact that service activities are characterized by simultaneity of production and exploitation, construction companies are likely investment in services to be promptly translated into growth opportunities. Hence, besides the benefits value creation, servitization is appear to be as a low risk strategy and easy-to-achieve (Hatzakis et al., 2010).
3.6 Chapter Summary and link
This chapter highlighted the processes, drivers, challenges, opportunities and benefits from various sector to the aim to pinpoint the common and different aspects of servitization. This chapter made it clear that these different sectors share common aspects of servitization, for instance the drivers of servitization in the above mentioned sectors include: financial, strategic and marketing rivers. With this in mind, it is also clear that the same common aspects of servitization in these various sectors are likely to be influential in the process of adoption of servitization the construction industry. In furtherance, the next section employs a Business Model Canvas (BMC) aimed at proposing a servitized business model for the construction industry and it is used as a conceptual framework for this research study.
CHAPTER FOUR: BUSINESS MODEL CANVAS (BMC)

4.1 Introduction
This chapter introduces a Business Model Canvas (BMC) with the aim of using it as a conceptual framework to propose a servitized business model in the construction industry. In furtherance, this chapter highlights the purpose that a BMC serves in businesses, and description of its nine building blocks. Additionally, this chapter looks at successful BMC’s that are in action from different sectors. In brief, this chapter aims to link how a BMC can be used as a conceptual framework towards the adoption servitization and shift form normal business models to more of servitized business models.

4.2 BMC
4.2.1 Definition of Business Model Canvas
The establishment and development of any business does not require only making business strategy but also the Business Model Canvas (BMC) with its key parameters which determine further growth of an economic entity which is sustained (Sabanti, 1998). There must be a consideration for renewing business models when accumulated positive qualities while development characteristics remain and evolve for the sustained growth of economic entities which includes the financial aspect. That means environmental factors and conditions determine the sustained growth of enterprise (Dudin, Ljasnikov, Kuznecov, and Fedorova, 2013).

The Business Model Canvas (BMC) is considered as a strategic management tool to rapidly and effectively characterize and impart a business idea or concept. Hence, it is utilized to picture all the building block of preparatory of a business, including clients, route to market, value proposition and finance. The adaptation of the Business Model Canvas pursues a goal to increase the effectiveness of financial management in enterprises by optimizing management approaches to budget models (Osterwalder and Pigneur, 2010).

4.2.2 Purpose of a Business Model Canvas (BMC)
Normally, managers and entrepreneurs confronted a contention between seeking after the organization's fundamental reason for maximizing profits and accomplishing different purposes, for example, producing positive social and environmental impact. As a result, these two purposes opposed, because one usually came at the expense of the other (Osterwalder and Pigneur, 2010). In many organizations, the appropriate response was to concentrate on the previous, while seeking after the last as an optional action in an organizational add-on, in the form that will appear to be
an entity for no profit which is created under the banner of corporate social responsibility (Joyce and Paquin, 2016). While on the other hand the pressure for businesses to respond to sustainability concerns is increasing.

Part of the focus of organizations is to effectively address issues relating to financial crises, economic and social inequalities, scarcity of material resource, environmental events, demand for energy and technological development (Joyce and Paquin, 2016). These previously mentioned challenges can be seen as opportunities for organizations to engage in sustainability-oriented innovation (Adams et al., 2015). For organizations to succeed, they should react to such difficulties by imaginatively incorporating eco-proficient and eco-successful innovations which encourage in preserving and enhance natural, social and financial assets into their center business (Castello and Lozano, 2011).

However, there is a need to transit beyond incremental, compartmentalized changes within an organization and towards more incorporated and essential transformation which reach across the organization and beyond its larger stakeholder environment in order for sustainability-oriented innovation to be truly impactful (Adams et al., 2015).

4.2.3 Business Model Canvas and its nine Building Blocks
Osterwalder and Pigneur (2010) define the Business Model Canvas (BMC) as cutting edge instrument for key management which can be utilized to streamline the money related part of activities kept running by a financial entity. The Business Model Canvas is keen in offering value to clients. This value offering is achieved by changing received assets into results. In fundamental piece, the BMC is an instrument of strategic management, including money related managements, and it contains nine essential units (figure 4):

- **Customer Segments**: (Who are the customers? What do they think? See? Feel? Do?). The Customer Segments Building Block defines the distinctive gatherings of individuals or associations an undertaking research to reach and serve clients include the core of any business model in the business ventures. In the absence of clients, no organization can make due for long. So as to fulfill client’s needs, an organization may aggregate them into particular segments with basic needs, basic practices, or different properties. A business model may outline one or a few substantial or little customer segments. An organization must settle on a cognizant choice about which portions to serve and which sections to
disregard. When this choice is made, a business model can be deliberately structured around a solid comprehension of explicit client needs.

- **Value Propositions**: *(What's compelling about the proposition? What can be done do make the product more attractive? Why do customers buy, use?)*. The Value Propositions Building Block describes the bundle of products and services that make an incentive for an explicit client portion. The value is the motivation behind why clients attracted to one organization over another. It takes care of a client issue or fulfills what clients require. Each value proposition comprises of a chose heap of products or potentially services that obliges the prerequisites of an explicit client segment. In this sense, the value proposition is a collection, or package, of advantages that an organization offers clients. Some value propositions might be inventive and speak to over again or troublesome offer. Others might be like existing business sector offers, however with included features and qualities.

- **Channels**: *(How are these propositions promoted, sold and delivered? Why? Is it working?)*. The Channels Building Block depicts how an organization speaks with and achieves its client segments to convey value proposition correspondence, circulation, and sales channels contain an organization's interface with clients. Channels are client contact focuses that assume an imperative part in the client encounter.

- **Customer Relationships**: *(How do you interact with the customer through their 'journey'?):* The Customer Relationships Building Block depicts the kinds of connections an organization sets up with explicit client segments. An organization ought to clear up the sort of relationship it needs to set up with every Client segment. Relationships can go from personal to automated depending on the extent an organization wants to engage with its clients.

- **Revenue Streams**: *(How does the business earn revenue from the value propositions?)*. The Revenue Streams Building Block signifies the money an organization produces from every client segment (costs must be subtracted from incomes to make profit) and if clients contain the core of a business model, income streams are its conduits. An organization must ask itself, for what value is every client segment genuinely ready to pay? effectively noting that question enables the firm to create at least one income streams from every client segment. Every income stream may have diverse valuing systems, for example, settled
rundown costs, haggling, selling, showcase subordinate, volume ward, or yield the management.

- **Key Resources**: *(What unique strategic assets must the business have to compete?)*. Every business model requires Key Resources. These resources allow enable an initiative to make and offer value proposition, achieve markets, keep up associations with client segments, and acquire incomes. Key resources can be physical, monetary, scholarly, or human. Key resources can be claimed or rented by the organization or procured from key accomplices.

- **Key Activities**: *(What uniquely strategic things does the business do to deliver its proposition?)*. Every business model calls for a number of Key Activities. These are the most imperative activities an organization must make to work effectively. Like key resources, they are required to make and offer an incentive, achieve markets, keep up client relationships, and get incomes. Furthermore, similar to key resources, key activities contrast contingent upon business model type.

- **Key Partnerships**: *(What can the company not do so it can focus on its Key Activities?)*. Organizations falsify partners whom they associate with, and on the other hand associations are turning into a foundation of numerous business model. Organizations make coalitions to streamline their business models, diminish risk, or obtain resources.

- **Cost Structure**: *(What are the business’ major cost drivers? How are they linked to revenue?)*. The Cost Structure depicts all expenses brought about to work a business model. This block portrays the most critical expenses brought about while working under a specific plan of action. Making and conveying value, keeping up client relationships, and creating income all cause costs. Such expenses can be determined moderately effortlessly subsequent to characterizing key resources, key activities, and key partnerships. Some business models, however, are more cost-driven than others.
The Business Model Canvas (BMC) is evident to be one of the innovative and strategic management tools to bring about efficiency and sustainability in other sectors (Osterwalder and Pigneur, 2010). Uber is a standout amongst the most unmistakable platform businesses and they are respected by trend-setters, people who are business minded, and less by some others. Once more, Uber has been in the story lines couple of times as of late and they are the best case of technology and innovation (Kalanick and Camp, 2017). Uber has recently become a mode of transportation service in demand by users which has gotten an upheaval the taxi business the whole way across the world. Uber business model has left many people including taxi associations yearning at the Uber App as to how the business model has made it more convenient for people by just a tap their smartphone and have a taxi land at their area in the base conceivable time (Kalanick and Camp, 2017).

When using an Uber app, a nearby driver in partnership to the business model will accept the users request, and the app will then display an estimated time for the driver to arrive the the users location. While the user is patiently waiting for the driver-partner, the app updates the user of the estimated time for the driver to arrive. The Uber app also make available information about the driver whom the user will be partaking the journey with, including the names of the driver-partner, vehicle make, and the registration number of the vehicle. This information helps both the driver-
partner and the user to connect at the pickup location. The app allows users to enter preferred destination anytime before or during the ride and if a user/client have a preferred route, it is helpful to talk through the directions together. The service provided by Uber is calculated automatically and charged to the payment method linked to the user’s Uber account (Kalanick and Camp, 2017). Figure 5 below, shows an example of a successful Business Model Canvas of an Uber that is under operation.


There are number of successful BMC that are in action. Just to mention a few, the “Empathetic Software Development” where it was discovered that the team’s effectiveness is constrained by a lack of business awareness. Most software developers focus too much on the technological aspects, and as a result most management teams offer their developers limited problems based on their poor technical knowledge and gut feelings. Noticeably, it was clear that there is massive value in

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aligning teams with a shared organisational vision. Thus, it brought a need for using the Business Model Canvas to create empathy between business and technical colleagues; at the same time creating efficient companies that innovate starting with the most basic and proceeding up to all the details. Figure 6, below is an example of a Business Model Canvas illustrating the business model of an online travel agent developed by the Empathetic Software Development.

![Business Model Canvas](https://cdn-images-1.medium.com/max/1600/0*pLH_1iIpRqzSCsXG.png)

**Figure 6:** Online travel agent Business Model Canvas. Source: [https://cdn-images-1.medium.com/max/1600/0*pLH_1iIpRqzSCsXG.png](https://cdn-images-1.medium.com/max/1600/0*pLH_1iIpRqzSCsXG.png)

Another good example of a BMC is the BMW company where the company runs a business of making and selling cars. Figure 7 below show a successful BMC of the BMW company which even today one of the biggest competitors in the market.
Lastly but not least, is the well known official website for booking accommodation at zero fees and at discounted rates. Booking.com allows users to compare places they wish to stay, check for affordability, and convenience for distance and traveling. The figure below (Figure 8) highlights the BMC for Booking.com which still makes it on of the biggest competitors for accommodation in the markets. 

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**Figure 7:** BMW Business Model Canvas. Source: [https://designabetterbusiness.com/wp-content/uploads/2017/10/Slide4-1-1024x576.png](https://designabetterbusiness.com/wp-content/uploads/2017/10/Slide4-1-1024x576.png)
4.3 Chapter Summary and link
This chapter highlighted the what BMC is and also its important and the purpose it serves. The BMC approach was used to highlight and showcase the factors influencing the transition from a typical business model to a more servitized business model. The nine building blocks of a BMC where also discussed with the aim proposing a servitized BMC for the construction industry from both the Client and Contractor’s perspective. Having successfully proposed a servitized BMC for the construction industry, the proceeds by deliberating the research approach and techniques that were employed in undertaking the research study.
CHAPTER FIVE: RESEARCH METHODOLOGY

5.1 Introduction
This chapter is dedicated to the methodology used in carrying out the research. This master dissertation research adopted a qualitative research method and relies on “Systematic Literature Review” as a research design. Moreover, this chapter provides an insight into the adopted research strategy and its’ associated features as it applies to the particular study.

5.2 Description of Research Approach
Research approach alludes to the instruments that one uses to do research. These can either be qualitative or quantitative or mixed (Brannen, 1992). Quantitative approach looks at numerical information and frequently requires the utilization of statistical apparatuses to dissect information gathered. This takes into account the estimation of factors and connections between them would then be able to be established and the data is presented using tables, charts and/or graphs. Qualitative approach is based on non-numerical data and enters around establishing patterns. Mixed method approach is a combination of both quantitative and qualitative research approach (Venkatesh, Brown, and Bala, 2013; Rittichainuwat and Rattanaphinanchai, 2015).

5.2.1 Qualitative approach, quantitative approach, and mixed method approach
Qualitative Research gathers data about past experiences, human behaviours, attitudes and the denotations that individuals attached to, based on observation and interpretation. In furtherance to this, qualitative research enables researchers in gaining better understanding of concepts that are complex in nature, interactions of social wellbeing or cultural phenomena. This type of research key in the exploration of “how” or “why” things have happened, interpretation of events and recitation of activities that occurred. Qualitative research approach gives experiences and comprehension of the issue setting. It is an unstructured, exploratory research that reviews very perplexing wonders that are difficult to illustrate with the quantitative research. In spite of the fact that, it creates thoughts or speculation for later quantitative research.

Quantitative research is a form of research that depends on numerical data and solid facts. The aim of this approach is to establish cause and effect relationship concerning two variables with the use mathematical and statistical methods. Quantitative research is known for its potentials to accurately and precisely deal with measurements due to its empirical nature. This approach is also known for categorizing or ranking the gathered data by the researcher and later use graphs and
tables to construct the raw data which makes it easier for the researcher to can interpret and analyze results. This type of research approach is helpful for discovering and giving answers to research questions that is keen at finding out what number of, how much, how frequently, or to what degree.

Mixed Method approach is an integration of both Qualitative and Quantitative research. It gives a complete approach joining and breaking down the measurable data with more profound contextualized bits of knowledge. Utilizing mixed method approach adds to empower triangulation, or check, of the information from at least two sources.

For the purpose of this study, a qualitative research approach was adopted and a systematic literature review (SLR) is also adopted as the research design for this study. Table 1 below differentiate the differences between the Qualitative method and Quantitative approach in gathering research data.
Table 1: Differences between the Qualitative approach and Quantitative approach. Source: Allwood (2012)

<table>
<thead>
<tr>
<th>Qualitative approach</th>
<th>Quantitative approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach is inclusive of focus groups, detailed interviews, and reviews of past or existing studies based on pre-selected themes</td>
<td>Conduct surveys, observations and structured interviews, and review of records for statistical purposes</td>
</tr>
<tr>
<td>Mainly inductive process is used to formulate theory</td>
<td>Mainly deductive process is used to assess and formulate theory</td>
</tr>
<tr>
<td>More subjective: the problem is described from the perspective of those experiencing it</td>
<td>More objective: the problem is described from observations of a program</td>
</tr>
<tr>
<td>Relies on the text content</td>
<td>Relies on numerical content</td>
</tr>
<tr>
<td>More detailed information from past literature</td>
<td>Less detailed but more extensive due to outsized across cases</td>
</tr>
<tr>
<td>Unstructured or semi-structured response options</td>
<td>Fixed response options</td>
</tr>
<tr>
<td>Findings can be valid and reliable: depending on the skills and in-depth of the researcher</td>
<td>Can be valid and reliable: depending on the tools used</td>
</tr>
<tr>
<td>Less planning and more analysis</td>
<td>More planning and less analysis</td>
</tr>
<tr>
<td>Less generalizable</td>
<td>More generalizable</td>
</tr>
</tbody>
</table>

5.2.2 Research strategy

Research strategy is a well ordered step-by-step plan of action that provides guidance to the researcher’s endeavors, with the aim to assist the research to comportment the research in a systematical manner in order to come up with quality findings and detailed report. There are different options in deciding which strategy to adopt in executing the research namely: experiment, surveys, case studies, systematic literature review, grounded theories and so on (Saunders, 2011).

For the purpose of this research study, a systematic literature review (SLR) was adopted as the research strategy. A systematic literature review is a qualitative research strategy which involves making sense of large bodies of information, and a means of providing answers to questions about what works and what does not – and many other types of question too (Petticrew and Roberts, 2006). This research design serves as means of mapping out areas of uncertainty and identifying
where little or no relevant research has been done, but where new studies are needed. Also, the use of SLR flags up areas where spurious certainty abounds (Gough et al., 2012).

Systematic literature review can be defined as a review of research literature using systematic and clear answerable strategies. The need for reviewing past studies or evidence, and synthesizing findings, appears to be a daily activities performed by individuals (Gardner et al., 2010). For example, when an individual considers to buy a new car, there are various activities that take place before making a decision. Individuals will ask themselves questions relating to: ‘which car should I buy?’ thus, this question alone can be broken down into a chain of questions which are influential towards making a decision. These chain of questions may include ‘which cars are available in the market?’; ‘what vehicle make do I want?’; ‘what range of cars can I afford?’; or, ‘which car will make me happy?’. Hence, data relating to wide range of cars and their makes is then gathered to help in the process of decision making and as such, this becomes an explicit example of literature review in daily lives on individuals.

The gathered information/evidence is critically reviewed and helps in identifying potential reasons for the decision that will be taken thereof. If the decision made relates to buying a small or cheap car, for instance, there will be a clear understanding that the findings and conclusions from the reviewed information written by people who like to drive sports cars and luxury cars may be of less value to the individual who is considers buying a small car than a review written economic purposes in media platforms. There are also characteristics that are of priority to the individual who is about to buy a car, such as reliability and safety, boot space, and other specifications relating to fuel consumption, and an attempt to identify more reviews that are of similar requirements to car considering to buy (Gough et al., 2012).

There are additionally numerous studies that have evident methodological or conceptual restrictions or do not report sufficient detail for their dependability to be evaluated. Indeed, even where a study is thoroughly thought out, executed and revealed, it might by chance have found and announced atypical discoveries thus ought not be depended upon alone. (Harden and Thomas, 2010). For every one of these reasons, it is shrewder to rely on decisions based on all the important and dependable research that has been attempted as opposed to an individual research or restricted gatherings of studies. In the event that there are varieties in the quality or importance in this past research, at that point the review can consider while examining its outcomes and reaching
determinations (Harden and Thomas, 2010; Hox, 2010). Authors continue by highlighting that On the off chance that there are varieties in research members, settings or conceptualizations of the phenomena under scrutiny, these likewise can be considered and may add solidarity to the findings.

While primary research has potential to produce much critical unique information and bits of knowledge, its findings may get little consideration when research publication are perused by just a few. Reviews can therefore advise us about what is known, how it is known, how this changes crosswise over studies, and along these lines additionally what is not known from past research (Gough et al., 2012). It can therefore provide a premise to arranging and translating new essential research. It may not be a sensible utilization of assets and now and again it might be dishonest to attempt research without being appropriately educated about past research; in reality, without a review of past research the requirement for new primary research is obscure (Lai et al., 2011).

The main aim of reviewing the literature systematically is to have such unequivocal, thorough and answerable strategies while considering dependability of the reviewed data and repeatability. Similarly, as primary research is relied upon to report straightforward, thorough techniques, similar norms can apply to systematic literature review and therefore, reviews of existing research can be productively focused on answering questions rather than addressing topic areas (Petticrew et al., 2006). The motive behind the research question drives the choice of the method and approach to find the answers and as such, individual experts are often consulted to answer questions about what is known from research (Paagman et al., 2015). Experts may obviously have numerous master abilities, including learning of research, viable experience of the wonders being considered and human understanding and certain information that have not been formalized in research. Notwithstanding, there are likewise perils from this wealth of learning not being express (Gough et al., 2012).

Gough et al. (2012) firstly highlights that the dangers that experts’ ideological and theoretical perspectives are exposed to, and thus the conceptual framework determining their appraisal of the research, will not be clear; and similarly as with everybody, these viewpoints might be affected by close to home interests in the issues being examined. Second, the limits of the expert’s knowledge may not be straightforward; that is the limits of studies familiar to them and thus the proper evidence will be considered. A third danger is that that regardless of whether the limits of the studies are clear, the expert may know a portion of the research inside those limits superior to
anything others so not the majority of the research will have measure up to portrayal in the
determinations they make. Lastly but not least, dangers are the related issues of how the experts
survey the quality and assess the importance and after that orchestrate diverse bits of evidence.
(Gough et al., 2012).

The possibility that diverse research questions might be addressed best by various techniques,
strategies, and by various kinds of data additionally applies to the depth of reviews. For instance,
systematic literature reviews addressing questions about the effects of healthcare interventions
have broadly concurred particular strategies for setting the extension, making a decision about the
nature of studies, and unveiling the integrated discoveries, frequently utilizing factual meta-
analysis of the results of randomized controlled preliminaries (Higgins and Green 2011). In any
case, a systematic question-driven approach to reviews can apply similarly to research questions
of process or of implying that are tended to by a qualitative research and by review strategies that
mirror those qualitative research approaches (Patterson et al., 2001; Pope et al., 2007; Sandelowski
and Barroso 2007).

Reviews do not exist in segregation; they are custom-made and directed by individuals at explicit
focuses in time with specific needs, priorities and methods for understanding the issues they
address. An essential beginning stage for understanding contrasts between reviews is accordingly
understanding the reasons that reviews are led, whose points of view they reflect, and the reason
that they mean to serve in the creation and refining of knowledge (Gough et al., 2012). With this
in mid, reviews can vary in their breadth, contingent upon the idea of research questions which
thus rely upon the degree of the research work being planned and the measure of time and assets
accessible to the researcher (Creswell, 2012).

Within the constraints of the breadth of the review question, reviews can be expansive or narrow
in their consideration criteria, strategies, approach and synthesis. In the event that the underlying
review question is generally restricted or narrow, all phases of the review, including the synthesis,
will likewise be moderately narrow (Dixon-Woods et al., 2006; Gough et al., 2012). Assuming,
be that as it may, the review question is broad, there are possibilities for the synthesis of data to be
similarly broad or for there to be a narrowing of consideration criteria after the mapping stage with
the goal that just a portion of the studies in the guide are incorporated into the gist of the data
synthesis. Hence, decisions about restricting the profundity of the review are generally identified
with the broadness of the research question and the time and assets accessible, however they can likewise relate to the reviewer’s determination (Harden and Thomas, 2010).

5.3 Justification for adoption of Systematic Literature Review as a Research Strategy
Research can be as systematic examination to come up with theories, establish evidence and it can also be helpful in problem solving. The method that is usually to perform a research is to embark on reviewing past research literature (Anderson., 2010). For individuals intending to create policies, practitioners and or any other individual that is about to make a personal decision, engaging with many research reports can be stressful and likely to be an impossible task. Rather, they depend on researchers and experts to stay informed concerning the developing literature, reviewing it and making it accessible in a more edible form (Gough et al., 2012).

In this study, the SLR is adopted as a strategy of choice. The selection of this strategy was premised on the researcher’s desire to seek answers to questions about the ‘what’, ‘how’ or ‘why’ of a phenomenon rather than ‘how many’ or ‘how much’, which are answered by quantitative approach. A research strategy helps a researcher to concoct a plan on the best way to continue on completing a specific research (Denscombe, 2014). Given the way that there is no unanimously acknowledged approach to lead a research, therefore a research strategy needs to incorporate (a) an unmistakable rationale of the research and the justification of that and (2) an activity plan and an explicit problem which needs to drive the research (Denscombe, 2014).

Systematic literature reviews are particularly significant as a means of reviewing all the evidence on a particular question from the previous studies where there is some uncertainty about the answer. If it is unclear whether a particular intervention is effective, then a systematic literature review of the available evidence may help resolve the issue by analyzing the data and drawing up conclusions (Lai et al., 2011; Gough et al., 2012). In offering quality assessed answers to research questions, systematic literature review does definitely more than give an alternate route to look into; they take into account more prominent use by surfacing the gathered literature from numerous research studies. The expanding profile of systematic literature review is a driver for revealing research adequately and unmistakably with the goal that it is available to reviewers and incorporated into reviews (Okoli, and Schabram, 2010). Systematic literature review requires the research studies that they incorporate to be fit for reason as far as their methodological quality and
as far as contributing findings to the review. As reviews require clear strategies, they also require primary research that clarifies unmistakably what was done and why (Gough et al., 2012).

Thus said, the SLR is related with strong evidence from previous studies of good quality research (Gough, Sandy, and Thomas, 2012; Denscombe, 2014). Subsequently, this is the motivation behind why they are adopted and utilized by researchers, experts and policymakers when there is a requirement for a solid and objective overview of the existing information on a particular topic of interest (Denscombe, 2014).

It is noticeable that a research is appropriate for being conducted by adopting systematic literature review, on the off chance that it is planning to accomplish any of the succeeding (Kitchenham, 2004):

- Compile the existing, reachable knowledge on an identified topic.
- Find out a gap in the current research aiming at proposing further research directions.
- Specify a framework to organize the new research on the topic.

For the purpose of this research study, it aims at finding out a gap in the current research aiming at proposing further research directions.

The SLR is fit for the purpose towards answering specific questions and testing theories than the traditional review of literature. Systematic literature reviews have not just given reliable responses to vital research questions of policy and practice, yet in addition it gives a chance to consider research activity in general and conveyed an alternate way to deal with pondering the idea of exact research problem (Dixon-Woods et al., 2006).

Furthermore, systematic literature review can examine old theories and propose new ones, think about where the parity of evidence lies in connection to a specific point, and give a premise to suggestions for intervention. They can give direction to researchers planning future studies, and give advantageous synopses of the literature on a specific issue (Dixon-Woods et al., 2006). Systematic Literature Reviews can similarly be utilized to analyze systematically the reasons why various research studies tending to a similar inquiry at times achieve distinctive decisions, a typical and unsatisfying issue for both the researchers and research users (Gardner, Whittington, McAteer, Eccles, and Michie S, 2010).
As the mapping of evidence uncovers the gaps in primary research and consequently sets a research motivation, correspondingly, assessing the techniques for primary studies uncovers relentless flaws and sets a methodological plan (Oakley *et al.*, 2005). Numerous systematic literature reviews address questions concerning adequacy. However, systematic literature reviews can also answer questions concerning risk factors, and about relationship between qualities of populates, and can explore relationship between risk components or indicators and results.

### 5.4 Important features of Systematic Literature Review (SLR)

Systematic literature review varies from an ordinary expert literature review. The differences between these two strategies of reviewing literature are highlighted by some key features below (Sumsunnahar, 2013):

- One of the imperative components in systematic literature review is the need to develop a review protocol. The review protocol determines the research questions being tended to and the techniques to be utilized for undertaking a specific review.
- A well-defined research strategy to be adopted in the review. The motive behind this search strategy is to ascertain as many as possible relevant literatures.
- The search strategy and results have been archived for the future reference of the pursuer.
- In assessing potential primary study, SLR requires the specification of inclusion and exclusion criteria for study selections.
- Systematic literature review indicates that the data should have been extracted from primary studies and assessed them through quality criteria.
- Systematic literature review is considered as pre-requisite for qualitative method which provides cohesive research studies from various sources on the same subject.

### 5.5 Procedure of Systematic Literature Review adopted in the study

A systematic review of the selected literature was conducted to explore the challenges of adopting servitization in the construction industry from 1994 till 2018 (24 years) to ensure validity across two decades. The search approach was developed by first selecting keywords and identifying the relevant databases within the set timeframe in which the research papers where published. Finally, identification and analysis of the papers was done by reading through the abstracts of each identified paper. At a later stage, after filtering the relevant papers, the entire content of the papers was read to identify the patterns and themes to help prepare and present the findings (Figure 9).
Figure 9: Generic procedure for Systematic Review of Literature

5.5.1 Steps adopted in the systematic review of literature
Reviewing literature systematically involves five key activities: review question, identifying and describing the relevant research (‘mapping’ the research), critically appraising research reports in a systematic manner, and bringing together the findings into a coherent statement, known as synthesis. As with all pieces of research, there is an expectation that the methods will be explained and justified, which is how we reach our definition that a systematic review of research is a review of research literature using systematic and explicit, accountable methods (Figure 10).

Figure 10: Five steps of the systematic literature review (Source: Okoli and Schabram, 2010)

Step 1: Review question
The question(s) that are to direct the SLR are expected to be answerable and accessible and along these lines ought to incorporate the accompanying variables: population of interest (P), Intervention (I), comparative interventions (C) and outcomes of interest (O) which are recognized
as the PICO format (The Cochrane Collaboration, 2005; Baloyi and Jordan, 2016). With this in mind, each sub-question discussed in chapter one was reviewed and revised to meet PICO requirements and later tested through search engines.

**Step 2: Searching the literature**

This step involves the formulation of a search strategy, which includes inclusion and exclusion criteria, keywords, sources of evidence, the documentation of the search, and selection of the research reports to be included (Okoli and Schabram, 2010). A broad selection of major databases was identified to cover a varied choice of publications. These databases included Compendex, Elsevier, Scopus, Springer link, ProQuest Central, ISI web of science, and EBSCOHost web. Again, consideration was given to the use of main keywords: such terms as Servitization and Product-Service Systems, and combinations of keywords, such terms as sustainability, service design, servitized products, value-in-use, service-centred, and service-oriented.

**Step 3: Critical appraisal**

This progression encompasses an in-depth appraisal of the selected studies so that reported research not meeting the consideration criteria, including the quality of the evidence, can be excluded from the final sample. Also known as “screening for prohibition or exclusion”, this step aims at assessing literature of the studies to make conclusions whether the studies are valuable for the review (Okoli and Schabram, 2010). As such, the quality of the studies is weighted and the researcher makes a decision if the appraised study has enough quality to meet all requirements for the subsequent stage of the efficient review.

Normally, the first prohibition would have just helped the reviewer to get a thought with respect to the dimension of nature of the gathered articles (Okoli and Schabram, 2010). Furthermore, quality appraisal is relied upon to take this preferred standpoint further. Okoli and Schabram (2010) as being of a noteworthy significance for the review of the literature. Hence, they recommend as being important to characterize stricter criteria to channel the articles and studies for a decent quality review.
Step 4: Data extraction

The objective of this stage is designing forms and structures where the primary data extracted from different studies will then be recorded accurately. It is in this stage that duplications identified and avoided in order to have accurate and reliable data (Okoli and Schabram, 2010). To put it in simple terms, data extraction is the progression in which every single important findings meeting the choice criteria are accumulated to frame the assemblage of evidence with respect to the research questions aimed at answering. The data extraction strategy comprises of two states: Preliminary analysis and secondary analysis (Sumssunahar, 2013).

Preliminary analysis

Preliminary analysis is considered as the underlying analysis of the acquired search findings. The motivation behind the examinations is to get suitable research papers which are applicable to the proposed research question. Firstly, this is carried out by reading the abstract of the paper, since abstract is short brief adaptation for the whole research paper. After the examination of the abstract, a choice can be made whether further perusing of the research paper would yield adequate intimations and answers for the proposed question. Since there would be quite a lot of results for the search keywords, this preliminary analysis would be the first sifting stage in the examination procedure.

Secondary analysis

Once the preliminary analysis is done accurately and complete, then secondary analysis is the performed. With regards to secondary analysis, the heading and subheading of the whole research study are analyzed. The suitable segment of the paper which yields confirmation and answers for the research question is featured and dissected all the more profoundly. This will give a knowledge into the research paper. In normal circumstances, after completion of the past two stages, the reviewer has a sensible and clear image of the contents of the articles and studies which will be incorporated into the review. The carried out during these two iterations is going to be the foundation of the review (Okoli and Schabram, 2010).

In short, data extraction step is another cycle of assessing identified research articles. The objective separate efficiently all data from each article so as to utilize it as contribution for data analysis phase (Okoli and Schabram, 2010). Given the previously mentioned features, each article was
reviewed again and it was assessed to guarantee that is legitimate to be part of the literature review. Denscombe (2014) highlights that a decent practice about literature review is to give a table organizing fundamental data about each article which has been assessed in a systematic literature review.

**Step 5: Data synthesis**

Data synthesis is the stage in the review process when studies meeting consideration criteria are abridged to frame the result of the systematic review. The aims of the data synthesis are to cumulative study findings for all studies meeting the consideration criteria; evaluate the quality of the study discoveries (Okoli and Schabram, 2010). Data synthesis comprises of grouping and outlining the aftereffects of the included primary studies. To put it plainly, the extricated data is then integrated so as to report the results of the inspected primary studies. One of the objectives of synthesizing is to give the answers to the proposed research question and as such answers may not only be found in a single study. Moreover, all the consulted sources from which the final answer is deducted should be highlighted and be recorded to bring value for future reference. In furtherance to this, answers that the study seeks to find may be examined and extracted from graphs, charts or a theoretical evidence of statements.

From the procedural perspective, the approach for literature review developed by Okoli and Schabram (2010) recommends that this progression could be led by utilizing an approach which may be qualitative in nature, quantitative or mixed method approach which reflects the combination of the two. By supplementing the distinct, the use of qualitative analysis with quantitative synthesis, there can be relevance in presenting the review resulting from the data analysis (Kitchenham, 2004). However, this kind of combination seems not to be widely used in reviews of the literature (Kitchenham, 2004). For the purpose of this dissertation study, the data analysis for this the literature review has been done through qualitative approach.

There are numerous strategies for synthesizing and analyzing qualitative research data and the options of qualitative data analysis include: conversation analysis, quality content analysis, discourse analysis, narrative analysis and grounded theory (Denscombe, 2014). Following this process, a Content Analysis was adopted for this study. Moreover, this data analysis technique was adopted for its superiority to can present the reviewed literature (primary findings) according to themes, patterns, and/or trends.
5.5.2 Application of the SLR in this study

At first, a broad selection of major databases was identified to cover a varied choice of publications. These databases included Compendex, Elsevier, Scopus, Springer link, ProQuest Central, ISI web of science, and EBSCOHost web (Table 2). The publications for the literature reviewed in this study were gathered in two parts. The first part gathered 397 full peer-reviewed scientific articles on the main keywords: such terms as Servitization and Product-Service Systems. The second part gathered 101 articles based upon the combinations of keywords, such terms as sustainability, service design, servitized products, value-in-use, service-centred, and service-oriented. The total reviewed papers of part one and part two amounted to 498, as shown in Table 2. Although 408 were central to the study, only 209 were used since they focused mostly on the same aspects. Table 1 only shows the number of papers acquired from the databases by just reading through their abstracts before they were pruned down through reading the entire paper to check their relevance towards building up the paper. These databases represent the main academic journals related to the subject.

Many of these keywords were combined with ‘construction industry’ in various search instances to ensure their relevance to this study. This set was then expanded and refined as appropriate articles were discovered. Baines et al. (2007) recommends that the abstracts of all the remaining articles were then considered and, unless thought inappropriate, the full paper was then read. The analysis itself was aided by applying mind-mapping techniques to capture and cluster the main themes and contributions. It is the analysis of these articles that forms the basis of the findings in this paper. More specifically, it is an addition to the work by Baines et al. (2007) and identifies the existence of research gaps in the literature.
Table 2: Main keywords and combinations

<table>
<thead>
<tr>
<th>Part 1</th>
<th>Part 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Keywords</strong></td>
<td><strong>Combination Keywords</strong></td>
</tr>
<tr>
<td>Servitization</td>
<td>Sustainability</td>
</tr>
<tr>
<td>Product - Service System (PSS)</td>
<td>Value-in-use</td>
</tr>
<tr>
<td>ISI</td>
<td>SPR</td>
</tr>
<tr>
<td>66</td>
<td>22</td>
</tr>
<tr>
<td>30</td>
<td>9</td>
</tr>
</tbody>
</table>

**Databases legend**

ISI = ISI web of science  
SPR = Springer  
PQC = ProQuest Central  
CPX = Compendex  
SPS = Scopus  
EBS = EBSCOHost web  
EVR = Elsevier

<table>
<thead>
<tr>
<th>Total from the databases</th>
<th>Total combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISI</td>
<td>SPR</td>
</tr>
<tr>
<td>96</td>
<td>31</td>
</tr>
</tbody>
</table>

5.6 Chapter summary and link

This was one of the significant chapters of this study as it gave an in-sight of how the study was carried. Firstly, it highlighted what a research approach is and differentiated those research approaches. After giving clear differences on those research approaches it stated which approach was adopted in the purpose of this study followed by the rationale. In furtherance to that, every research study must have a research strategy that will support the approach adopted by the study. This chapter again highlighted different types of strategies that one may consider while undertaking a research and continued by stating which research strategy was adopted to fit the purpose of the study. Moreover, justifications where also brought up to support why the certain strategy was adopted instead of others by highlighting the important features of the strategy adopted. Lastly but not least, this chapter highlighted the procedures followed in putting together this research work. The next section presents and discuss the findings of the analysis pertaining to the aims and objectives that the study strives to achieve.
CHAPTER SIX: PRESENTATION AND DISCUSSION OF FINDINGS

6.1 Introduction
This chapter presents the discussion of findings from reviewed literature of servitization and its adoption. The findings deriving from the reviewed literature of servitization were presented in this section in accordance to the designated themes.

6.2 Success factors (Theme A)
Success factors are a predetermined number of key factors or conditions that tremendously affect how effectively and successfully an organization meets its central goal or the key objectives or targets of a program or task (Trkman, 2010). Moreover, success factors are those variables or circumstances necessary to enable a positive outcome for a business program or strategy (Lindner and Wald, 2011). For the purpose this study serves, there is a need to explore the success factors for adoption of servitization and they are discussed later. Table 3 shows the success factors for adoption of servitization that various authors highlights in different sectors and discussed afterwards.
Table 3: Success factors for adoption of servitization

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Sector</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge-based assets</td>
<td>• Manufacturing</td>
<td>(Rouse et al., 2011)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Lertsakthanakun et al., 2012)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Kohtamaki and Partanen, 2016)</td>
</tr>
<tr>
<td>Organization Strategy and</td>
<td>• Manufacturing</td>
<td>(Wise and Baumgartner, 1999)</td>
</tr>
<tr>
<td>operations</td>
<td>• Automotive</td>
<td>(Oliva and Kallenberg, 2003)</td>
</tr>
<tr>
<td></td>
<td>• Technology</td>
<td>(Weeks, 2010)</td>
</tr>
<tr>
<td></td>
<td>• Building and Information</td>
<td>(Aho, 2013)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Raja et al., 2013)</td>
</tr>
<tr>
<td>Leadership commitment</td>
<td>• Manufacturing</td>
<td>(Burns, 1979)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Bass, 1990)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Raja et al., 2013)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>(Nie and Kosaka, 2014)</td>
</tr>
</tbody>
</table>

Servitization is defined as the strategic innovation of organization’s abilities and procedures to transit from offer just products to offering an integrated product and service solution that delivers value in use (Weeks, 2010). There are various forms of servitization and they range from products with services as an “add-on”, to services with substantial products. They tend to be delivered utilizing client driven strategies so as to give anticipated outcomes for the client., Oliva and Kallenberg (2003), Baines et al. (2009), Wise and Baumgartner (1999), Weeks (2010) and many other authors asserted that to execute a servitization strategy effectively, organizations are required to change their techniques, operations, technologies, people groups for supporting social moves in the authoritative outline, and system integration capacities.

However, observers have additionally recommended that organizations need to keep up a steady stream of innovation, not just as far as what is offered to the client, yet in addition in how products
and services are designed, created, delivers, and showcased. Some of the success factors of adoption of servitization include: Knowledge creation, increased revenues, competitive advantage, and leadership as discussed below.

6.2.1 Knowledge-based assets
Knowledge acquisition is a prerequisite for change (Rouse et al., 2011) that facilitates servitization because the shift from a product-oriented to a customer-oriented business model means to enter markets that are still new with integration of material products and imperceptible services, without completely knowing the attributes of the latter. In this manner, the servitization procedure requires the organization to change and extend its knowledge keeping in mind that adding services to the tangible products require obtaining and distributing the services own sets of knowledge, competently incorporating them with those of material products (Lertsakthanakun et al., 2012).

As companies offer more innovative modified solutions, the role of knowledge-intensive business services, i.e., manufacturers’ product-related services that create knowledge for the development of modified solutions, increases in significance (Kohtamaki and Partanen, 2016). Furthermore, there is a chance to procure new knowledge during a servitization strategy implementation, and how this and how this knowledge is both spread and coordinated inside an organization.

6.2.2 Leadership commitment
Through the past decades, service industries have grown significantly have turned into a predominant idea in the present economy. Numerous organizations are transforming themselves from products-dominant organizations towards service-prevailing rationale organizations, with the aim to leverage in competitive markets (Nie and Kosaka, 2014). These authors continue by mentioning that even for companies still in manufacturing industry, they still create joint value through a transiting from offering product to offering product-service system through adoption of servitization strategy to innovate organizational competencies and progressions.

The leadership of developing a successful product-oriented business are fundamental key supporters of the procedure of change. It is noticeable that employees are urged to make more association with clients for value co-creation in service businesses and also appears that employees that have good knowledge are not supervised or given detailed guidance compared to product-oriented business (Prabhu et al., 2013). Additionally, leaders can direct a prosperous change
towards servitization of business and viably advances their leadership for knowledge creation businesses that are service-driven.

Burns (1979) introduced the concept of transformational leadership and developed by Bass (1990). Burns (1979) recognized the two ideas of between transactional leadership and transformational leadership. Transactional leaders traded unmistakable prizes for the commitment of workers while transformational leaders involve their employees, motivate and meet their core needs. It was noted that how transactional leadership varies from transformational leadership is that transformational leadership gives vision and feeling of mission, imparts pride, gains regard and trust (Nie and Kosaka, 2014). Nie and Kosaka (2014) continues and emphasize that these leaders can make dreams that give their employees the sentiment of being at the dynamic focuses of the social request. Subsequently, this achieves a requirement for more transformational leaders so as to have a larger number of firms that are service benefit driven than those that just offer products.

6.2.3 Organization’s strategies and operations

Servitization represents a business-model transformation and organizational transition from selling pure goods to selling a blend of goods and services. The strategy and operations that an organizational follows becomes one outcome of this shift which can result in a competitive advantage for an organizational in the markets (Bustinza, Bigdeli, Baines, and Elliot, 2015). A plan determining how an organization will distribute assets so as to help infrastructure and operations is deemed to be a strategy. An operations strategy is ordinarily determined by the general business strategy of the association, and is intended to expand the adequacy of production and bolster components while limiting expenditures. During servitization, organizations pursue stages to acknowledge introduction of services as a chance to separate from products and accomplish higher consumer loyalty and satisfaction (Trentina, Forza, and Perin, 2011).

Firms are increasingly exploring the value of blending goods and services, which improvements in higher profit margins and the prospect of gaining competitive advantage out of their customer base is the motive behind the anticipation of this transition (Baines and Lightfoot 2013). Servitization offers the opportunity to generate sustainable competitive advantage through enhanced strategies and operations, since it liberates firms from contending on cost alone, considering more noteworthy separation and expanded consumer satisfaction and loyalty.
Apart from designs that are related to structural issues, it is indistinct whether servitization techniques truly do add to both a stronger competitive position in the value chain and superior performance. Servitization also builds boundaries to competition as service organizations fabricate a profound comprehension of clients' encounters and needs and may likewise amass favorable position of scale (Raja et al., 2013).

### 6.3 Failure factors (Theme B)

Failure factors are factors which will in general undermine the capacity of the organization or business venture to accomplish effective execution and as a rule these factors might be the inverse of achievement factors (Hamed and Abolfazl, 2016). For the purpose this study serves, there is a need to explore the failure factors for adoption of servitization and they are discussed later. Table 4 shows the failure factors that may hinder the adoption of servitization that various authors highlights in different sectors and discussed afterwards.
Table 4: Failure factors hindering the adoption of servitization

<table>
<thead>
<tr>
<th>Failure factors</th>
<th>Sector</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inability to design for services</td>
<td>• Manufacturing</td>
<td>• (Ostrom et al., 2015)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>• (Yu and Sangiorgi, 2017)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>• (Bailey, 2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (Teixeira et al., 2017)</td>
</tr>
<tr>
<td>Lack of knowledge towards servitization</td>
<td>• Manufacturing</td>
<td>• (Silvestro and Lustrato, 2015)</td>
</tr>
<tr>
<td>transition and innovative practice</td>
<td>• Building and Information</td>
<td>• (Aho, 2013)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing and Technology</td>
<td>• (Grubic, 2014)</td>
</tr>
<tr>
<td>Poor Management of Transition Risks</td>
<td>• Manufacturing</td>
<td>• (Yu and Sangiorgi, 2017)</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
<td>• (Neely, 2008)</td>
</tr>
</tbody>
</table>

Servitization has been acquainted with a depict of developing affinity for manufacturing firms to create service offerings that stretch out past their customary center product offering. It is noticeable that manufacturing companies in a wide range of industries are servitizing, trying to expand a lot of incomes from service offering (Benedettini et al., 2015). The authors further highlight while a few organizations report that servitization has delivered aggressive development destinations, others seem to battle to divert a benefit from their service businesses. The risks of failure of the servitization procedure are high likewise on the grounds that organizations may neglect to improve their plans of action intelligibly to the new offerings during the transition process (Tukker, 2015). Some of the failure factors for adoption of servitization include: inability to design for services, transfer of technology and innovative practice, lack of knowledge, and risks as discussed below.

6.3.1 Inability to design for services
Design for services has gained attention in service research as it brings new ideas to life and can support manufacturing and service companies to create new value propositions. Service Design is characterized as a holistic, human-centered and co-creative approach to predict new service ways to conceptualize service and create new solutions exist (Ostrom et al., 2015). Then again, service design takes into account client's encounters from a comprehensive point of view and imagine
inventive approaches to help value co-creation forms with clients and different partners (Yu and Sangiorgi, 2017).

Bringing together PSS and Service Design complementarities can support companies co-create new product-service solutions, to advance their structure forms, and to enhance their business situating. Service design should be better consolidated in right on time and later phases of the improvement procedure, so design commitments can be successfully fused in the execution procedure (Bailey, 2012). Inability to design for services can result in hindrances for companies in co-creating new product-service solutions. Moreover, service design also needs to be better infused into current companies’ design practices, to better support their transition towards service. Thus, organizations that fail to plan for services at and hierarchical dimension, when the products are taken to markets they likewise fail to meet usefulness and business models (Teixeira et al., 2017).

6.3.2 Lack of knowledge towards servitization transition and innovative practice

In servitized manufacturers, the coordination between research and development unit and market and sales unit represents a key viewpoint in executing services. As servitizing firms offer increasingly redid and value proposition, the top to bottom comprehension of individual and frequently dormant client needs turn out to be always critical (Cenamor, Sjodin, and Parida, 2017). Not exclusively is such knowledge about the client crucial for the centering of the service portfolio, it additionally influences the servitizing company's capacity to create and offer services in synergistic procedures with the client (Aho, 2013).

An absence of innovative knowledge of what the innovation can convey as far as business execution, production adaptability, efficiency and development is additionally thwarting servitization appropriation (Grubic, 2014). Again, the absence of a technological knowledge and innovative practice at the organizational dimension is an aftereffect of not perceiving the value technological change can deliver. This bring vulnerability that numerous organizations don't realize where to begin, how to begin and what procedure to experience. Therefore, technological and innovative knowledge is key in firms to achieve innovation, production and upper hand in the markets (Grubic, 2014).
6.3.3 Poor Management of Transition Risks
At the point when a manufacturing business settles on the choice to adopt a servitized model, there are explicit difficulties they confront, basically in light of the fact that a service culture is diverse to a make it and offer it. The design of services varies product design, requiring a transition in corporate mentality to make the execution of this model effective (Yu and Sangiorgi, 2017). Further difficulties for organizations actualizing a servitization model is the vulnerability of cost-effectiveness gain. As indicated by Neely (2008), the figure of traditional product based organizations that have been servitized is more noteworthy than traditional manufacturing as far as sales are concerned, they will in general bring down rate sales. Likewise, the number of servitized organizations revealing liquidations will in general be higher than among non-servitized organizations. The key cautioning to regard here is that servitization sets aside opportunity to create, and will not be a medium-term sensation.

6.4 Probable Drivers, Challenges and Opportunities (Theme C)
Drivers can be defined as persuasive elements that prompts an occasion to happen, while challenges might be viewed as obstruction in a work environment or association that counteract compelling trade of thoughts or considerations and anticipate something occurring. Furthermore, opportunities are deemed exploitable set of conditions with dubious result, requiring commitment of resources and including acquaintance to risk. For the purpose this study serves, there is a need to explore the probable drivers, challenges and opportunities for adoption of servitization and they are discussed later. Table 5 highlights those drivers, challenges and opportunities from different sectors as well as the authors who highlighted them.
<table>
<thead>
<tr>
<th>Element</th>
<th>Sector</th>
<th>No. of reviews</th>
<th>Example of Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>Financial</td>
<td>25</td>
<td>(Sawhney et al., 2004)</td>
</tr>
<tr>
<td></td>
<td>Automotive</td>
<td></td>
<td>(Oliva and Kallenberg, 2003)</td>
</tr>
<tr>
<td>Strategic</td>
<td>Manufacturing</td>
<td></td>
<td>(Baines T, 2013)</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td></td>
<td>(Ahamed, Inohara, and Kamoshida, 2013)</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td></td>
<td>(Hou and Neely, 2013)</td>
</tr>
<tr>
<td>Marketing</td>
<td>Retailing</td>
<td></td>
<td>(Blut et al., 2014)</td>
</tr>
<tr>
<td></td>
<td>Marketing</td>
<td></td>
<td>(Keränen and Jalkala, 2013)</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td></td>
<td>(Lertsakthanakun et al, 2012)</td>
</tr>
<tr>
<td>Challenges</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Service design</td>
<td>Manufacturing</td>
<td></td>
<td>(Baines and Lightfoot, 2009)</td>
</tr>
<tr>
<td>Finance, knowledge and information</td>
<td>Manufacturing</td>
<td></td>
<td>(Hou and Neely 2013)</td>
</tr>
<tr>
<td>Policies and organizational structures</td>
<td>Manufacturing</td>
<td></td>
<td>(Kindström, 2010)</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td></td>
<td>(Ahamed, Inohara, and Kamoshida, 2013)</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td></td>
<td>(Baines and Lightfoot, 2013)</td>
</tr>
<tr>
<td>Opportunities</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Research and Development</td>
<td>Manufacturing</td>
<td></td>
<td>(Ahamed et al., 2013)</td>
</tr>
</tbody>
</table>
The presented data shows that there is a continuous increase in the awareness and a need for adoption of servitization since individuals and the society are becoming mindful of the potential benefits that comes with the adoption of servitization. Yet there are barriers of achieving servitization due to inability to design for services, financial challenges, lack of knowledge and proper information about servitization, policies, organizational structures, and other factors resulting from the fragmentation of the construction industry. The studies showed that a significant number of servitizing firms were attempting to receive the financial related benefits yet failed publicized by past authors. This connects with a noticeable change in the recent tone of the servitization literature which tends to concentrate more vigorously on not only the drivers, but the difficulties and opportunities related with making the progress towards more servitized provisions. The following driver, challenges, and opportunities appear to be the most common from the reviewed literature in the process of adopting servitization.
6.4.1 Drivers
Firms are progressively moving far from creating unadulterated physical products to offering service provisions for a few reasons. From finding another focused source or maintaining a strategic distance from cost rivalry, to enhancing their traditional manufactures and contending in an undeniably globalized market (Confente, Buratti, and Russo, 2015). There is a need to try enhancing and making products and services that address clients’ issues all the more exhaustively so as to abstain from contending exclusively on a cost premise (Confente et al., 2015; Turunen and Finne, 2014; Urban and Zucchella, 2011). The probable drivers for adoption of servitization appear to be financial, strategic and marketing related drivers.

Financial drivers
Reviewed the literature alludes to higher net revenue and strength of salary for organizations that have delighted in progress with this approach and accomplished stable incomes from services, regardless of critical drops in sales. Moreover, because of the product-service integration, firms will in general be less delicate to cost based competition and can achieve more elevated amounts of productivity than when offering physical products alone (Sawhney et al., 2004). Past research studies have additionally discovered that product-service sales in general be counter-patterned or more impervious to the monetary cycles that influence investments and products acquisitions (Oliva and Kallenberg, 2003).

Strategic drivers
Few authors highlighted that strategic drivers are fundamentally related with increasing competitive advantage, and utilize service components to separate manufacturing offerings and in this way give imperative focused opportunities (Gebauer and Fleisch, 2007; Hou and Neely, 2013). services can bring explore in gaining competitive advantage since services will in general be less visible, more hard to copy and more work subordinate (Baines et al., 2009). Moreover, from a strategic perspective, the difficulty of imitation and the level of invisibility can induce competitor lock-out (Baines, 2013). Offering more elevated amounts of services can expand the engaging quality of the offerings. At the point when this new offering offers a superior service than the opposition, it can turn into an essential competitive advantage and could even differentiate the firm from its rivals (Ahamed, Inohara, and Kamoshida, 2013).
Marketing drivers

Marketing drivers are commonly perceived as adopting services to offer more products. The service feature is outstanding to impact acquiring choices, and evaluating its significance has been an enduring convention in the marketing literature. Besides, service from a marketing point of view enables organizations to make client loyalty on the grounds that it will in general incite rehash deals and, by intensifying contact opportunities with the customer, can place the supplier in a position to offer other products or services (Blut et al., 2014; Keränen and Jalkala, 2013).

In accordance with this, client desires or requests are getting to be ever more elevated. Organizations ought to in this way transit in accordance with those exclusive requirements as far as executing client centricity. Therefore, from a marketing viewpoint, because of servitization, organizations acquire understanding into the requirements of clients, which in the long run could prompt product differentiation (Lertsakthanakun et al., 2012). From this point of view, servitization is a reaction to clients requests that were not satisfied previously. Actualizing client centricity and closeness gives more client contacting focuses. This prompts enhanced client relationships, custom fitted offerings and actuates rehash sales.

6.4.2 Challenges

Rather than the drivers that lead organizations to adopt servitization, research studied have likewise focused on the difficulties that obstruct the adoption of servitization. A servitized offering can in this way be a challenge or make a contention between the servitized offering and the longing for expanded proprietorship from the client. Because of an association's expanding diversification significant difficulties emerges as far as required investments and changing risk profile and thus servitization brings up intriguing issues with respect to the monetary effect of its adoption (Neely, 2009). The adoption of servitization by an ordinary manufacturing companies essentially presents difficulties for service design, finance, knowledge and information, and policies and structures (Baines et al., 2009; Ahamed, Inohara, and Kamoshida, 2013).

Service design

Service design differs from conventional product design and could discourage companies from following a servitization strategy since it is a step outside the comfort zone. In the design processes, there is a need for including both service and product features that are consistent with the delivery
of through-life performance (Baines and Lightfoot, 2009). Again, design for services should include the appropriate measurements of what the market demands. As such, the focus should not only be on the amount of services added, but again, focus on the added value of each service designed.

**Finance, knowledge and information**

This relates to the need for financial resources to provide helpful services to integrate the traditional system and achieve a sustainable competitive advantage. This may prompt obstruction in some organization capacities, where a service strategy probably will not be understood or considered. Therefore, this can lead to unexpected expenditures and absence of knowledge and skill in pricing services (Confente et al., 2015). Moreover, the absence of knowledge and information might represent an obstacle, especially for traditional firms, where there is absence of skills in the service division and the absence of innovative capacity, knowledge, and management of information (Kindström, 2010).

**Policies and organizational structures**

Organizational structure and culture can pose a challenge for manufacturers relating to the need to transit that is required to transform the organizational culture into a broader approach that supports the development of services (Ahamed, Inohara, and Kamoshida, 2013). This can encounter a deficiency of service-based organizational structures, the absence of a service-oriented culture and preconceived resistance to change. Thus, creating an organizational context that is oriented towards service can be very challenging for firms (Baines and Lightfoot, 2013).

**6.4.3 Opportunities**

Servitization brings an opportunity for innovation of organization capabilities and processes to transit from offering products to offering integrated products and services that deliver value in use. Servitized offering encompasses the blending of products and services in order to fulfill the needs of the customers, in other words servitization brings an opportunity for customer satisfaction, functionality, sustainability of products, and whole life value (Ahamed et al., 2013). Ahamed et al. (2013) continues to highlight that firms also have an opportunity for improvements in business efficiencies, cost savings and predictability, while on the other hand there can be improvements of
business competitiveness, focus and growth. Moreover, servitization is evident for knowledge creation and opens an opportunity for research and development.

6.5. Business Model Canvas from a construction perspective

Business model structure was defined on the basis of the business model canvas (BMC) developed by Osterwalder and Pigneur (2010). BMC was chosen due to the ease of its practical application, complexity of components, worldwide recognition, and previous contributions to the development of circular business models (Mentink, 2014). Firstly, literature categorization must be developed according to the Business Model Structure from the construction industry perspective. Secondly, formulate a structure to keep record of the literature and the later propose and develop a conceptual framework using the BMC approach.

This study employed formulation of a table devoted to develop a BMC from a construction industry perspective for both the Client and the Contractor for a typical residential project. The table below (Table 6 and 7) presents an overview of categorizing literature according to the adopted Business Model structure later present the developed Business Model.
Table 6: Categorization of literature devoted to develop a BMC for a Construction Client

<table>
<thead>
<tr>
<th>BM components</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Partners</td>
<td>Gadde and Dubois (2010); Pekuri et al., 2013; Khalfan et al., 2010; Tang et al., 2010; Aho, 2013</td>
</tr>
<tr>
<td>Key Activities</td>
<td>Van Rijn, 2005; Bennett, 2003; Aiyetan et al., 2013; Alsolaiman, 2014; Al-Kharashi and Skitmore (2009); Sweiss et al., 2007; Boyd and Chinyio (2006); Kylintri et al., 2012</td>
</tr>
<tr>
<td>Key Resources</td>
<td>Sacks, Koskela, Dave, and Owe, (2009); Hwang and Ng (2013); Froese( 2010)</td>
</tr>
<tr>
<td>Value Proposition</td>
<td>Vandermerwe and Rada (1988); Baines et al. (2011); Hytönen (2005); Neely (2008); Vladimirova et al. (2011); Aho (2013); Kolk (2004); Brax (2005); Robinson et al. (2016)</td>
</tr>
<tr>
<td>Customer Relationships</td>
<td>Bygballe, Jahre, and Sward (2010); Sashi (2012); Bowden (2009)</td>
</tr>
<tr>
<td>Channels</td>
<td>Vaananen, and Belt (2010); Taryn, Bond,Herman., and Fabris (2013); Vivian, Tam, ShenbJoseph, Kong, (2011)</td>
</tr>
<tr>
<td>Customer Segments</td>
<td>Pekuri et al. (2013); Kajula, Artto, Aaltonen and Turkulainen (2010); Kryvinska et al. (2014); Lockett et al. (2011); Vladimirova et al. (2011); Robinson et al. (2016)</td>
</tr>
<tr>
<td>Cost Structure</td>
<td>Neely (2008); (Monghasemi, Nikoo, Fasaee, and Adamowski (2015); Dudin et al. (2013)</td>
</tr>
<tr>
<td>Revenue Streams</td>
<td>Dai (2017); Mazen and El-Diraby (2013); Buser and Carlsson (2016); Achtenhagen, Melin, and Naldi (2013)</td>
</tr>
</tbody>
</table>
**KEY PARTNERS**
- Suppliers
- Investors
- Contractors
- Architects
- Quantity Surveyors
- Construction Engineers
- Developers

**KEY ACTIVITIES**
- Project design
- Appointment of main contractor/professionals
- Payment authorizations
- Improve project production/performance
- Decision making

**VALUE PROPOSITION**
- Servitized products
- Client satisfaction
- Sustained products
- Efficiency
- Products aligned to meet client’s business model

**CUSTOMER RELATIONSHIPS**
- Partnering
- Customer referrals
- Customer loyalty programs
- Rating and feedback
- Accessibility

**CUSTOMER SEGMENTS**
- Agencies (those who are willing to buy and lease)
- First time owners (those who are considering to own instead of leasing)
- Value seekers (those who need reliable and sustainable products)
- Servitization seekers (those who are willing to pay for products that are accompanied by services/those who are willing to pay for both products and services)

**KEY RESOURCES**
- Venture Capital (Financial Resources)
- Skill and experienced staff/partners/professional (Human Resources)
- Professional advices (Intellectual Resources)

**CHANNELS**
- Websites
- Social media channels
- Media platforms

**COST STRUCTURE**
- Design costs (planning stages)
- Direct project costs (delivery stages)
- Consultation fees (professionals)
- Administration expenditures

**REVENUE STREAMS**
- Investors
- Asset capital
- Leasing

**Figure 12:** Proposed servitized BMC for a Construction Client
Table 7: Categorization of literature devoted to develop a BMC for a Construction Contractor

<table>
<thead>
<tr>
<th>BM components</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Partners</td>
<td>Akintoye and Main (2007); Gadde and Dubois (2010); Pekuri et al., 2013; Khalfan et al., 2010; Tang et al., 2010; Aho, 2013</td>
</tr>
<tr>
<td>Key Activities</td>
<td>Akintoye and Main (2007); Kwok and Hampson (1997); Van Rijn, 2005; Bennett, 2003; Aiyetan et al., 2013; Alsolaiman, 2014; Al-Kharashi and Skitmore (2009); Sweiss et al., 2007; Boyd and Chinyio (2006); Kylindri et al., 2012</td>
</tr>
<tr>
<td>Key Resources</td>
<td>Hwang and Ng (2013); Eriksson and Westerberg (2011); Hartmann and Briskom (2010); Nieto-Morote and Ruz-Vila (2011)</td>
</tr>
<tr>
<td>Value Proposition</td>
<td>Kryvinska et al. (2014); Lockett et al. (2011); Vandermerwe and Rada (1988); Baines et al. (2011); Hytönen (2005); Neely (2008); Vladimirova et al. (2011); Aho (2013); Kolk (2004); Brax (2005); Robinson et al. (2016)</td>
</tr>
<tr>
<td>Customer Relationships</td>
<td>Prahalad and Ramaswamy (2004); Edvardsson, Tronvoll and Gruber (2011); Meng (2012)</td>
</tr>
<tr>
<td>Channels</td>
<td>Taryn, Bond,Herman., and Fabris (2013); Vivian, Tam, ShenbJoseph, Kong, (2011)</td>
</tr>
<tr>
<td>Customer Segments</td>
<td>Kajula, Artto, Aaltonen and Turkulainen (2010); Kryvinska et al. (2014); Lockett et al. (2011); Vladimirova et al. (2011); Robinson et al. (2016)</td>
</tr>
<tr>
<td>Cost Structure</td>
<td>Cui, Hastak, and Halpin, (2010); Subramani, Sruthi, and Kavitha (2014); Mohammad et al. (2010)</td>
</tr>
<tr>
<td>Revenue Streams</td>
<td>Osterwalder and Pigneur (2010); Dai (2017); Segerstedt and Olofsson (2010)</td>
</tr>
<tr>
<td>KEY PARTNERS</td>
<td>KEY ACTIVITIES</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------</td>
</tr>
<tr>
<td>• Suppliers</td>
<td>• Deliver Projects</td>
</tr>
<tr>
<td>• OHS Authorities</td>
<td>• Ensure quality</td>
</tr>
<tr>
<td>• Sub-Contractors</td>
<td>• Management of vendors and trades</td>
</tr>
<tr>
<td>• Skilled laborers and artisans</td>
<td>• Buying and leasing</td>
</tr>
<tr>
<td>• Construction Engineers</td>
<td>• Appointing sub-contractors</td>
</tr>
<tr>
<td></td>
<td>• Project management and supervision</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>KEY RESOURCES</strong></td>
</tr>
<tr>
<td></td>
<td>• Experienced and skilled laborers (Human Resources)</td>
</tr>
<tr>
<td></td>
<td>• Tools, Equipment and Materials (physical Resources)</td>
</tr>
<tr>
<td></td>
<td>• Specialists advice (Intellectual)</td>
</tr>
<tr>
<td></td>
<td><strong>KEY ACTIVITIES</strong></td>
</tr>
<tr>
<td></td>
<td>• Deliver Projects</td>
</tr>
<tr>
<td></td>
<td>• Ensure quality</td>
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<tr>
<td></td>
<td>• Management of vendors and trades</td>
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<tr>
<td></td>
<td>• Buying and leasing</td>
</tr>
<tr>
<td></td>
<td>• Appointing sub-contractors</td>
</tr>
<tr>
<td></td>
<td>• Project management and supervision</td>
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<tr>
<td></td>
<td><strong>VALUE PROPOSITION</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Contractor</strong></td>
</tr>
<tr>
<td></td>
<td>• Competitive advantage</td>
</tr>
<tr>
<td></td>
<td>• Increased profit</td>
</tr>
<tr>
<td></td>
<td><strong>CHANNELS</strong></td>
</tr>
<tr>
<td></td>
<td>• Websites</td>
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<tr>
<td></td>
<td>• Media platform</td>
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<tr>
<td></td>
<td>• Word of mouth (direct contact)</td>
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<tr>
<td></td>
<td>• Flyers</td>
</tr>
<tr>
<td></td>
<td><strong>CUSTOMER SEGMENTS</strong></td>
</tr>
<tr>
<td></td>
<td>• Government</td>
</tr>
<tr>
<td></td>
<td>• Consulting companies</td>
</tr>
<tr>
<td></td>
<td>• Companies in general (both from private and public sectors)</td>
</tr>
<tr>
<td></td>
<td>• Users that need their business models to meet its functionality</td>
</tr>
<tr>
<td></td>
<td>• First time owners</td>
</tr>
<tr>
<td></td>
<td>• Those with designs but no resources</td>
</tr>
<tr>
<td></td>
<td>• Users in need of servitized products</td>
</tr>
</tbody>
</table>

**Figure 13:** Proposed servitized BMC for a Construction Contractor
Transition from a typical business model to a servitized business model

The presented data above on the BMC study was incorporated aimed at proposing a conceptual frame for adoption of servitization in the construction from the client and contractor’s perspective. The study highlights how a typical construction BMC differs with the proposed servitized construction BMC. Figure 14 below highlights the transition from a typical construction BMC to a proposed servitized construction BMC influenced by the success factors (the figure below is only a summarized model, refer to appendix section for a detailed transition model).

![Figure 14: Summarized transition from a typical business model to a servitized business model](image)

6.6 Chapter summary and link

This chapter presented and discussed the findings in accordance to the pre-selected themes, namely: the success factors and failure factors in relation to the adoption of servitization. Tables (table 3, 4, 5, 6, and 7) were used to support the presented data and well as graphs used to emphasize and show the trend of the reviewed relating to probable drivers, challenges and opportunities towards adoption of servitization. Furthermore, this chapter highlighted the typical BMC in the construction industry for both the client and the contractor and also proposed
conceptual framework for servitization in the construction industry using a BMC approach. Proceeding to the last chapter of the study, it concludes by giving a brief summary of how the study answered each objective and later gives recommendations for future study and performing another research study that will include the construction consultants in proposing another business model canvas-enabled conceptual framework.
CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions
This chapter summarizes and concludes the research study. The main aim of the research study was to propose a Conceptual Framework (CF) for adoption of servitization in the South African Construction industry using the Business Model Canvas (BMC) approach. The study endeavored to achieve its aim with the objectives mentioned at the beginning of the research study (in chapter one). The following were the objectives of the study and how the study achieved/responded to its objects.

1. Define the concept of servitization.
   Firstly, to achieve this objective; an extensive review of literature was conducted through the SLR strategy to gather an insight of the concept of servitization. This study defined servitization as a transition from delivering of products to delivering of products that are blended with services, or rather to products that are service-orientated in order to co-create value through functionality of business models and client’s satisfaction. This study continued to define the concept of servitization by highlighting its evolution (how it came about till date), its implementation and procedures towards its adoption.
   The research study did not only end there but, it went an extra mile to define the concept of servitization looking from different sectors (these sectors included: the manufacturing sector, healthcare sector, automotive industry, and the construction industry as well). This cross-sectional study explored how other sectors perceive servitization and the study went further by exploring the drivers of servitization of these various sectors, the challenges faced that may hinder the adoption of servitization, the process of servitization, opportunities, and benefits that comes with the adoption of servitization.

2. Explore how servitization is applicable in the construction industry.
   Secondly, in order to respond to this objective, the study took a closer look in sectors/industries that have a very close relationship with the construction industry (sectors mentioned in under discussion of the first objective). Responding to this objective, the study looked for what is common as well as the differences from the cross-sectional literature. This is because the construction industry has a tendency of learning from other industries (e.g. lean construction, supply chain management, etc) and re-design to fit the construction industry model. Having these answers from different industries (e.g. drivers, challenges, opportunities and benefits), it
becomes easier to predict whether the concept of servitization will be successful or fail when introduced into the construction.

The construction industry does not fully rely on the answers from other industry, hence they do further research and tests the applicability of the concept before it can be implemented. How other industries response to the concept of servitization gives the construction industry some alerts as to which areas to intensely look into in the process of adopting the concept. In short, the research study highlighted that the concept of servitization is applicable to the construction industry in terms of co-creating of value to the construction end-users/clients by delivering of products that will meet the client’s business model which result in client’s satisfaction while on the other hand functionality is key in this process.

3. **Identify the most prevalent success/failure factors that influence the adoption of servitization in the construction industry relying on examples from other sectors.**

Thirdly, the study went an extra mile again in extensively performing systematic literature review (SLR) from the past studies that associate themselves with the concept of servitization. The study defined what success factors and failure factors are in order to have a clear knowledge before these factors can be identified in the context of servitization. The study identified few success factors which commonly appeared to be knowledge-based assets, leadership commitment, and organization’s strategies and operations. If these few aspects can be present in the adoption of servitization in the construction industry, then possibilities may result in successful adoption of servitization.

However, where there is success there are also possibilities of failure and as a result the reviewed literature points out that there are also failure factors that may hinder the adoption of servitization in the construction industry. The gathered literature points out some common failure factors that are likely to hinder the adoption of servitization in the construction industry these factors included; inability by organizations to design for services, lack of knowledge towards transition and innovative practice, and that organizations as well as company owners are afraid to take risks towards adoption of servitization since they might have negative impacts on the finances of the company or loose loyal customers.
4. Propose a business model canvas-enabled conceptual framework for the adoption of servitization in the construction industry based on construction clients and construction companies.

Lastly but not least, the research study defined what a BMC is as well the importance and purpose it serves in business ventures. The study continued by breaking down the nine building blocks of a BMC and throwing in examples of successful BMC that are currently in operation. The literature was reviewed again to comprehensively discuss the gist of each building block of the BMC. The motive behind that was to draw attention on how BMC models works in different sectors and thus leading the study to snapshot a typical construction BMC in the Built Environment. In furtherance to that, the study went back and looked at the concept of servitization again and vigorously review how each building block can be transited from just being a typical block, but to be a more servitized block in relation to the construction industry. As such, to achieve this objective gathered all these data and develop a servitized model for both the construction client and the contractor. With this being done, the study managed to propose a business model canvas-enabled conceptual framework for the adoption of servitization in the construction industry based on construction clients and construction companies. These proposed model is detail under the appendix section.

In summarizing and concluding, the study has used the servitization literature to comprehensively assess the probable drivers, challenges hindering the adoption of servitization, and opportunities that servitization may convey to the construction industry. Furthermore, the study explored the applicability of the concept of servitization in construction industry in assuring client value through delivering end-products accompanied by services to meet the clients purpose/use. This study also highlighted the need for a better understanding of how servitized business models can leverage upon functionality and satisfaction through offering coordinated blend products and services that deliver whole life value to clients.

It proposed a conceptual framework for adoption of servitization using a BMC approach that construction business models find ways of adding value by adding services to the product to satisfy client’s needs, and create awareness with respect to concerns associated with servitization. Creating a service-oriented environment and finding the right people for the service dimension is key to success. In providing services, both the construction client and the contractor must be
convinced that people are their main asset (the major shift required in moving from a manufacturing to service culture). Finally, by offering services, companies gain insight into their customers’ needs and are able to develop more tailored offerings.

7.2 Recommendations
Based on the findings of this research, the following are recommended:

- The study recommends future research endeavors as to how can the proposed business model canvas-enabled conceptual framework for the adoption of servitization in the construction industry based on construction clients and construction companies can be operationalized in construction business.
- Since the study was only concerned with proposing a BMC for only the construction client and contractor, it is recommended to performing another research study that will include the construction consultants in proposing another business model canvas-enabled conceptual framework for the adoption of servitization in the construction industry.
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