Loughborough Design School

Supporting SMEs' adoption of sustainable Product Service Systems: A holistic design-led framework for creating competitive advantage

By

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Doctoral Thesis

Submitted in partial fulfilment of the requirements

for the award of Doctor of Philosophy

of Loughborough University

© September 2014

Abstract

This thesis explores effective and contextually appropriate means through which manufacturing SMEs can create competitive advantage through design and sustainable Product Service Systems (PSS). The exploration focuses on how design capabilities can be developed and used in non-design led contexts to drive an effective adoption of sustainable product service systems, creating competitive heterogeneity.

A comprehensive review of literature gave understanding of perspectives to competitiveness issues, how organisations have been supported towards PSS, sustainability and design adoption and related challenges. From this review surfaced the need to be cautious of contextual considerations leading to a Delphi study. The purpose of the Delphi study was to identify factors relevant for SMEs in Botswana to embrace sustainable PSS as a competitive business strategy. Priorities from the Delphi study informed a study aimed at exploring competitiveness experiences of SMEs and their perceptions of sustainability and product service systems. Following the position of experts on industries highly prioritised in Botswana's economic diversification agenda, this was done with a specific industry; the leather industry.

Possible opportunities of how design can address challenges identified and how PSS and sustainability can open new business opportunities for SMEs were also drawn from the findings. A systems success framework was developed using the main findings. The framework was tested through workshops with 3 SMEs who were also participants in the previous study. Through interactions with designers, the workshops exposed SMEs to design and PSS. Findings from the workshops indicate that through design capabilities SMEs can recognise opportunities and translate them in a service context to differentiated offerings suitable for their various markets. A designerly approach also offered a simplified but holistic process for SMEs to engage in systems thinking.

Keywords: Design capabilities, sustainability, product service systems, SMEs, competitiveness, design and PSS adoption

Acknowledgements

List ofPublications

Rapitsenyane, Y and Bhamra, T (2013). The place of sustainability through Product Service Systems in manufacturing SMEs in Botswana: A Delphi study, *In Proceedings of the 16th Conference of the European Roundtable on Sustainable Consumption and Production (ERSCP) & 7th Conference of the Environmental Management for Sustainable Universities (EMSU)*, June 4 -7, Istanbul

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Rapitsenyane, Y, Bhamra, T and Trimingham, R (2014). Competitiveness experiences of Botswana SMEs in the leather industry and their perceptions of sustainability and Product Service Systems, *In Proceedings of the 20th International Conference of Engineering, Technology and Innovation & IEEE Technology Management Council*, June 23-25, Bergamo

Rapitsenyane, Y, Bhamra, T and Trimingham, R (2014). Design led PSS adoption as a competitive approach in non-design led SMEs in Botswana, *In Proceedings of the 4th Design, Development & Research Conference,* September 8-10, Cape Town

Table of contents

List of Tables

List of Figures

Definition of terms

Capabilities – competencies required for an organisation to create and deliver value to its customers

Co-design - is a product, service, or organization development process where designers empower, encourage, and guide users to develop solutions for themselves

Design – an exploratory planning and decision-making process to determine the functions and characteristics of a finished product, service, system or any combination of the three. Design in this thesis is viewed from product design perspective.

Design capabilities – competencies that support the design in creating and delivery value to customers and keeping it worthwhile to stakeholders

Designerly – a perspective influenced by the mind-set of a designer in exploring opportunities, problem solving and developing business solutions

Design leadership – a mind-set to want innovation through the intersection of organisational leadership actions and design capabilities, exploring the potential of design as a transformative force in business and society

Innovation – the process of introducing a new product, service or system and delivering to customers in turn generating profits

Micro organisations – Small companies employing 1 to 6 people including the owner/manager and have an annual turnover of not more than P60, 000

New Product Development (NPD) – the complete process of bringing a product to market in a business organisation

Product – a tangible assert resulting from New Product Development as acquired by users for the utility they provide in meeting their needs

Product Service Systems – a business strategy that aims at shifting the business focus form producing and selling individual products to producing and selling a mix of products and services to meet customer needs

Rebound effect – a setback in sustainability achievements resulting from lack of consideration of other aspects

Service – an intangible product or a utility offered to users through tangible products which is consumed as produced

Servitization – the process of intensifying service contents of value created in manufacturing companies

Stakeholders –actors in the value chain in a business transaction affected by the business as a whole and impacting on value creation and delivery.

Sustainability – a term used following the Brundtland Report (1987) definition of sustainable development as development that meets the needs of the present without compromising future generations to meet their needs

Sustainable design – a design process that focuses on dealing with environmental, social and economic impacts of products, services and systems in a life cycle approach over a period of time

Sustainable innovation – an innovation process that aims at introducing and measuring new business improvements in terms of product, service, process or system across sustainable development pillars of society, economy and environment

Small and Medium Enterprises (SMEs) – small companies including micro organisations that do not employ more than 100 people including the owner/manager and have an annual turnover of less than P5,000,000.

Systems – a set of interconnected products and services working together in an environment that supports and facilitate value creation and delivery

Value – the worth of a product, service or system measured by the requirements for creating it and satisfaction users derive from it

1 Introduction

This chapter introduces and explains the central ideas of the research discussed in this thesis, leading to a description of the gap in knowledge in relation to SMEs in a developing context. It then explains the focus of this exploration by setting out the main aim and objectives. The chapter concludes by providing the thesis structure and a synopsis of contents in each chapter.

1.1.   Resource limits and sustainable innovation in manufacturing

Our current rate of material extraction for industrial activities poses a threat for our future generations to perhaps match trendy lifestyles of modern day development. Dependency on finite resources rapidly being exploited to meet increasing needs of an increasing population, satisfied by individual product ownership is a true picture of unsustainable consumption (Evans et al., 2009). Revolutionary new technologies are not necessarily the answer to all problems caused by our industrial systems but new revolutionary ways of thinking which embody effective use of resources, optimised use of available technology and collaborative ways of creating value in a systemic manner (UNEP, 2011). The importance of industrial sustainability for manufacturers cannot be overemphasised. The concept of industrial sustainability aims at aiding manufacturers make significant savings from eco-efficient practices to eco-effective strategies involving closed-loop processes that consider the entire product life cycle (Sustainability Learning Centre, 2013). Industrial sustainability concepts and strategies are essential in addressing environmental and social concerns with financial targets when looked at as a whole, making industrial sustainability a fit into the triple bottom line philosophy of environment, people and profits (Evans et al., 2009).

Energy and materials are major issues in resource efficiency. Eco efficiency refers to doing more with less and its adoption by industry can reduce environmental impacts (Knight and Jenkins, 2009). However being less bad is not the answer as with current approaches of being less bad adopted by companies especially in industrialised nations who account for 30% or more of greenhouse gas generation, the earth still takes one

year and four months to recover from resources humanity consume in one year (Evans et al., 2009).

1.2.   The potential of decoupling to creating competitive heterogeneity

The ultimate aim of eco-efficiency and eco-effectiveness is to decouple economic success from resource consumption to reduce the environmental impacts of production and consumption while enabling businesses to make profits and offering livelihood to customers. This has been effectively practiced in the motor industry through lean manufacturing (See Figure 1-1), reducing the amount of resources used to produce each vehicle as well as negative environmental impacts. The results of this approach are benefits through resource and impact decoupling (see Figure 1-2). In resource and impact decoupling, economic growth is achieved through use of fewer resources and producing less environmental impacts (UNEP, 2011). Adopting strategies such as lean manufacturing, and developing other capabilities can create competitive heterogeneity, where the company gains a unique position in the market as a result of its different use of resources (Hoopes and Madsen, 2008).
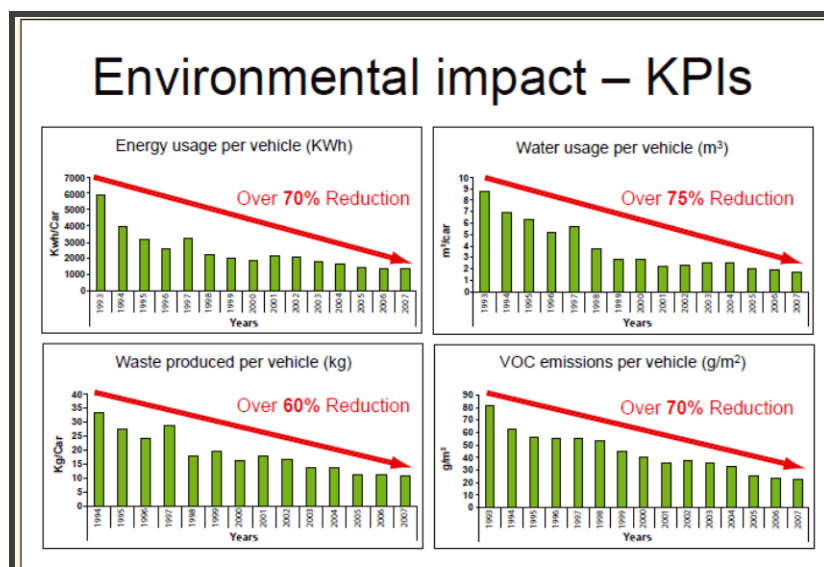
Figure 1-1: Cost savings across key performance indicators (Evans et al, 2009)

2
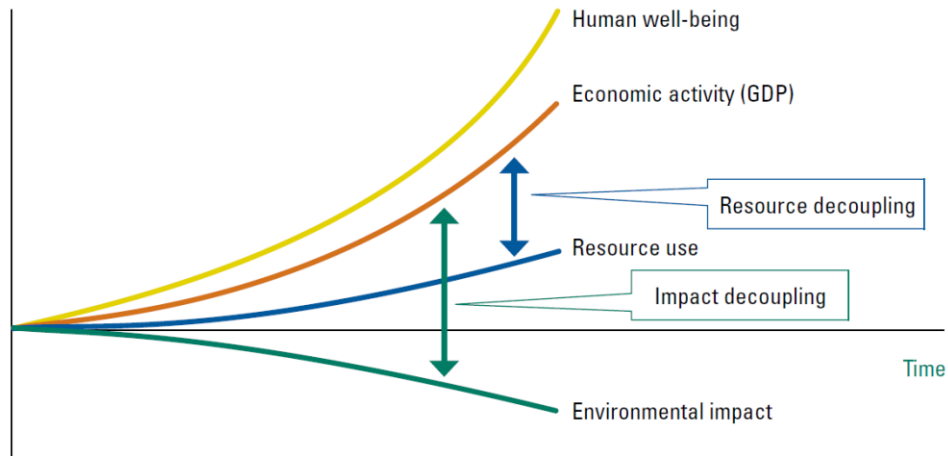
Figure 1-2: Resource and impact decoupling (UNEP, 2011)

The use of material resources to create economic value by manufacturers requires a life cycle approach since products can have negative environmental impacts at any life cycle stage (Bhamra and Lofthouse, 2007). For manufacturers a life cycle approach is an opportunity for product stewardship to aid material recovery at the end of life of the product (Lewis, 2005). The idea behind product stewardship is to reduce waste caused by consumption patterns during product use by empowering producers with the responsibility to take back their products at the end of life (Michaelis, 1995). This can be achieved through legislation as was the case in Europe, called extended producer responsibility (Michaelis, 1995; Lewis, 2005), or through a voluntary approach as was the case in the United States (Fishbein, 2000). Voluntary product take back depends on responsibilities shared by consumers, government, manufacturers and other stakeholders in the value chain (Lewis, 2005). Product stewardship, resource and impact decoupling can be driven by design and product service systems to create competitive advantage. Opportunities to deploy company resources through a life cycle approach can be exploited from such approaches as design for remanufacture, repair, longevity and reuse. Differences in how companies deploy their resources for these concepts can create competitive heterogeneity, where the company gains a unique position in the market, often with the emphasis to develop dynamic capabilities (Hoopes and Madsen, 2008).

1.2.1. Decoupling through design and product service systems

Involving various actors across a product life cycle is systemic in nature (Charnley et al, 2010) which requires that the design of products caters for all life cycle stages and not only end of life (Lewis, 2005). The second dimension to consider is the system itself to facilitate interactions between actors in win-win problem solving scenarios. Complex problems systemic in nature provide an opportunity for designers to adopt holistic and integrated approaches to develop more sustainable solutions to deliver customer satisfaction (Coley and Lemon, 2008; Charnley et al., 2010). Although incremental solutions are valuable, the need to move towards more sustainable products, services and systems to meet customer needs is even more inevitable (Bhamra and Evans, 1997; Charnley et al., 2010).

Through an integrated approach, placing emphasis on services can cater for decoupling in product-oriented manufacturing companies whose current model encourages consumption of more resources for economic gains at the point of sale for individual product ownership (UNEP, 2011; Tan et al, 2006). This addition of the service component, also called servitization (Gabauer et al, 2011) or product service systems (PSS) aims at a shift from producing and selling physical products to co-creating value with customers in a form of a mix of products and services to meet their needs (Manzini and Vezzoli, 2003; Tukker, 2004).

1.3. Engaging SMEs with design capabilities and Product Service Systems: Gap in knowledge

In spite of wide development of methodological support for manufacturing companies to take up Product Service Systems (PSS) on one hand and exploit design capabilities on the other, PSS industrial application is still low and there has been limited research in developing design capabilities to support PSS adoption, especially for SMEs, even worse those without any prior design knowledge. Most PSS research has focused on large companies in developed countries believed to be ready to achieve a service economy with availability and use of advanced technologies, transport, communication systems and people believed to be generally getting to embrace services (Baines et al.,

2007). Although observed by Manzini and Vezzoli (2002) that PSS has the potential in developing countries to help bypass a stage of development characterised by individual ownership of physical products, this area has been largely undersubscribed.

However, the decoupling potential of PSS in manufacturing SMEs in developing countries can be significant especially where voluntary product take back is adopted to increase availability of materials for new products. SMEs can benefit from this approach as their lack of finance and cost of raw materials usually stifles their growth (Temtime, 2008). This is especially important as SMEs facing competitiveness threats from cheaper offerings are likely to increase resource consumption in a bid to increase economic success, as their observed copying behaviour of practices from western economies increases (Letsholo et al., 2009). Achieving economic success through reduced use of resources and reducing environmental impacts through PSS can drive SMEs to a service economy (Meier et al., 2010). PSS with these capabilities are known as sustainable Product Service Systems (Manzini and Vezzoli, 2003; Hernandez-Pardo, 2012).

Design with its capabilities especially through its ability to support innovation, is crucial in this process. In addition to innovation, differentiation, improved offering's quality and competitiveness are essential design capabilities especially where design has the opportunity to assume a leadership role (Gillespie, 2008). Since SMEs investigated in this research are micro companies, the owner/manager is directly involved in all decisions and value creation processes (Temtime, 2008). Design can gain a high status in the company and be used to support innovation in product/service development (Lee and Evans, 2012). Using design in this way within sustainable PSS as a business strategy can harmonise the conflict between design and business within SMEs, especially when SMEs ultimately see the economic value of design and sustainable PSS in their businesses through the ability to gain competitive edge.

As a socio-technical construction, there is a need to understand the contexts within which PSS is being studied (Tan and McAloone, 2006). Being socio-technical means there is need to understand systems involving people and resources, enabling a set of

5

activities to be carried out, within a company and in the society at large having far-researching impacts on users' values and expectations (Trist, 1981) on how their needs can be met. Through design, especially its user-centred approach, it is possible to engage SMEs in socio-technical constructions. Research addressing this engagement in manufacturing SMEs in developing countries is limited. Manzini and Vezzoli (2003) refer to this engagement as strategic design for sustainability where partnerships and stakeholder relationships play a major role in resource optimisation as their economic interests converge in a PSS framework.

Although literature points towards the need for manufacturing companies to be PSS providers in order to achieve sustainability at a service level, there is very little work done on SMEs, especially micro companies. Hernadez-Pardo's (2012) research has notable explorations for design and PSS research in SMEs, though competitiveness was not really the main focus of the research but mentioned as a potential benefit. Another notable work focusing on SMEs looks at how systemic considerations for manufacturing SMEs can reduce their environmental impacts especially waste efficiency initiatives yielding cost benefits (Seidel et al., 2008). Seidel et al.,'s research is however limited as it focuses on the introduction of eco-efficiency taking advantage of the influence of the owner/manger's behavioural influence over all decisions. The position of the owner/manager is on the flipside viewed as positive to expedite the process of sustainability, design and PSS collaborative take up in SMEs.

There has been work done over the years on; [1] design and sustainable design support programmes for SMEs (Maxwell and van De Vorst, 2006; O'Connor and Cox, 2005; O'Rafferty and O'Connor, 2009); [2] design as a source of competitiveness in SMEs (Mozota, 2003; 2006); [3] developing dynamic capabilities in organisations as a way of creating competitive edge (Hoopes and Madsen, 2008; Barney, 2001); [4] how SMEs absorb design management knowledge (Acklin, 2013); and servitization and developing PSS in SMEs (Gabauer et al., 2011; Hernandez-Pardo, 2012). However, the relationship between these management concepts of competitiveness and those of design and sustainable PSS as a source of competitive edge is still incoherent. How exactly SMEs

6

can develop and deploy dynamic design capabilities at a leadership level to adopt product service systems as a competitive strategy is still under investigated. The aim and objectives of this thesis are described in the following section.

1.4. Aims and objectives

This research project has been outlined to explore the gap described in section 1.3 with SMEs in the developing context of Botswana as a way of extending research on decoupling economic success from resource consumption in manufacturing companies. Botswana is a developing country in the transition to being an upper middle income economy. The population of Botswana is just over 2 million and the country's GDP was $14.79 billion by end of 2013 (World Bank, 2014). Further, of importance in the selection of this context is the potential of PSS in encouraging development and wellbeing mainly characterised by less ownership of physical products. The rationale behind this decision is also on the current Botswana government efforts on economic diversification, targeting growth and development of specific sectors of manufacturing SMEs like the leather industry.

1.4.1. Aim

The overarching aim of this research is to explore effective and contextually appropriate means through which manufacturing SMEs can address their competitiveness needs, through developing design leadership capabilities to support sustainable Product Service Systems adoption.

1.4.2. Objectives

1. To review literature on business innovation in the context of sustainability; product service systems; organisational development view of competitiveness and competitive edge through design capabilities.
2. To identify factors relevant for manufacturing SMEs in Botswana to explore sustainable PSS as a competitive business strategy.
3. To explore competitiveness experiences of leather manufacturing SMEs in Botswana and their perception of sustainability and product service systems.

4. To carry out an in-depth exploration of how SMEs can recognise and apply design capabilities to differentiate themselves by creating sustainable PSS offerings through interactions with sustainable designers.

1.4.3. Research questions

1. What are the important factors to be considered for SMEs in Botswana to adopt sustainable PSS as their competitive business strategy?
2. What constitutes experiences of SMEs in the leather industry leading to their competitive advantage or disadvantage?
3. How do SMEs in the leather industry understand sustainability and Product Service Systems?
4. How can SMEs recognise and apply design capabilities to exploit sustainable PSS potential in order for them to differentiate themselves?

1.5. Scope

The following defines the scope of this research project:

- In this research the major focus is on encouraging SMEs' take up of sustainability through Product Service Systems by tagging its competitive advantage benefit for small companies in a developing economy. This benefit is explored from the perspective of design leadership. This research does not estimate competitive advantage through price related calculations but investigates non-price related factors that affect the competitiveness of SMEs.

- The impact of Product Service Systems on user behaviours of whether to own a product or not is not directly investigated in this research, since direct contact has only been made with SMEs. User perspectives have been explored in terms of co-creating value with SMEs through other user research tools like personas.

- The resource decoupling potential of Product Service Systems for manufacturing companies is the main driver for its exploration in SMEs in developing countries. Other sustainability business models are not within the scope of this research.

- The focus is on how SMEs in the leather industry can use design leadership through design capabilities to improve their competitiveness as Product Service Systems providers. This means that this research does not explicitly address other organisational change issues beyond dynamic capabilities that may affect the extent to which design and Product Service Systems can be utilised by SMEs.

- In addition, the research primarily focuses on the influence of design in the entire offering differentiation as well as sustainability considerations for the PSS product idea and the entire PSS. In this thesis, design is therefore largely not viewed in isolation but in the context of sustainable design. In the same vein, designers referred to in this thesis are also looked at as designers with sustainable design capabilities.

1.6. Thesis outline

This thesis is based on research studies conducted between 2011 and 2014 and comprises of nine more chapters briefly described below.

Chapter 2 – The context of Botswana

This chapter provides a description of SMEs in the context of Botswana, including their significance in the economy of the country. Particular challenges for SMEs in this context and their competitiveness problems are described, including a picture of sustainability and design in the country. As a consequence of understanding of the context, areas of literature review are identified as presented in the next chapter.

Chapter 3 – Literature review

In this chapter, a literature review conducted on business innovation in the context of sustainability; product service systems; organisational view of competitiveness; and competitive edge through design capabilities is presented. The central idea is competitive sustainable business innovation through adoption of product service systems and design capabilities. The chapter concludes by demonstrating the need for research, presented in subsequent chapters.

Chapter 4 – methodology

The research methodology chapter presents the roadmap for this research project and the rationale behind decisions made over selection of methods and analysis of data, to demonstrate the rigour of the research findings and the project at large.

Chapter 5 – Scoping study

This chapter presents the main findings of a Delphi study conducted with a homogenous panel of 9 experts as a scoping study. The context justifying the need for the Delphi study is described together with objectives and research question guiding the study. The direction for further research in this project is defined from insights gained from the findings. *In* order to provide an overall breadth of the evidence, the study briefly introduces the case of manufacturing SMEs in Botswana then details the results of the Delphi Study.

Chapter 6 - Experiences and perceptions of SMEs in the Leather Industry

This chapter presents a case study conducted with 18 leather manufacturing SMEs in Botswana. A description of the context is provided. The main findings are discussed, leading to drawing implications of SMEs' competitiveness experiences and perceptions

of sustainability and PSS for practice. These are translated into a systems success framework to allow further testing of these implications for practice.

Chapter 7 – Main findings of exploratory workshops

This chapter presents the main findings from exploratory workshops conducted as justified in section 4.7.4 and provides a higher level description of themes and their relationships resulting from the data analysis process. A detailed background of the context in which SMEs operate is provided, followed by a description of the procedure adopted for all the three workshops conducted and presentation of themes.

Chapter 8 – Exploratory workshops

This chapter presents proceedings of interactive workshops conducted with 3 SMEs in the leather sector belonging to three different industries of shoe, bag and furniture, and industrial designers. A justification of this approach in the context of participant SMEs is described and key observations from each workshop are presented under themes identified during analysis. Conclusions from each workshop create room for comparison of these observations, making provision for drawing similarities and differences in outcomes of the interactive process between SMEs and designers.

Chapter 9 – Discussion

This chapter collates findings and insights from previous chapters and raises themes to guide discussion of these findings and insights, illustrating an analytical response to research questions. Further, a critical reflection on research findings is demonstrated throughout this chapter, showing how major outcomes of this research evolve into a process for practical use and academic discussions.

Chapter 10 – Conclusions

In this chapter, conclusions are drawn from the experiences of this research project, demonstrating how the aim and objectives have been met. Contributions to knowledge are also discussed. The chapter concludes by discussing limitations of the research and areas for future research.

2 The context of Botswana

This chapter provides a description of SMEs in the context of Botswana, including their significance in the economy of the country. Particular challenges for SMEs in this context and their competitiveness problems are described, including a picture of sustainability and design in the country. As a consequence of understanding of the context, areas of literature review are identified as presented in the next chapter.

2.1. SMEs structure and composition

There is no single definition for Small and Medium Enterprises (SMEs). This is country specific depending on a chosen criterion. In the context of Botswana, the government of Botswana (1999) holds limiting parameters for defining these establishments. Micro enterprises in the policy are also referred to as the informal sector. The descriptions of the three sectors of small, micro and medium outlined in the policy are summarised in Table 2-1. In this context there is the addition of the micro sector, hence Small, Micro and Medium Enterprises (SMMEs). However, throughout this thesis a universally known acronym (SMEs) has been used to refer to the same.

Table 2-1: Definition of SMEs in Botswana (Government of Botswana, 1999)

Sector	No. of Employees	Annual turnover	Location
Micro	Less than 6 including the owner	P60,000	Rural areas
Small	Less than 25	Between P60,000 and P150,000	In semi-urban and urban areas
Medium	Less than 100	Between P1,500,000 and P5,000,000	Mostly urban areas

2.2. Why SMEs? What is their significance in Botswana's economy?

Botswana has over forty years enjoyed a dramatic economic growth, earning titles such as "a sign of hope for sub-Saharan Africa and as an exemplar of prosperity and success", (Hillbom, 2008) with diamond discovery in the 1960s elevating the country's

GDP growth (Mokhawa, 2005). Diamond revenue clearly pushed the country into the middle-income economies (Temtime and Pansiri, 2006). With a clear demonstration of a decline in mineral reserves (Lange and Wright, 2004) it is important to recompense this depletion through initiatives that can generate capital with little or no dependence on minerals, hence little environmental impacts and less dependency on finite resources. The government of Botswana's economic diversification strategy envisaged in Government of Botswana (1997), commonly known as Vision 2016, earmarks a number of areas for this sustainable growth and economic diversification. Notable economic growth areas highlighted include global competitiveness, industrialisation manufacturing niches, trade tariffs and small-scale business. Small-scale business is expanded in the Vision as referring to SMEs with a highly recognised importance in economic stability through involvement of citizens in industrialising Botswana. "The need for coherent and holistic Government policies to support the private sector, and the development of small and medium scale enterprises must be addressed as a matter of urgency" (Government of Botswana, 1997,p.43).

To this regard the government has long been in support of SMEs. However, this support has mostly been financially inclined (Pansiri and Temtime, 2008). Financial assistance policies and programmes have been established and ran through Financial Assistance Programme (FAP) initiated in 1982, SME policy (Government of Botswana, 1999), Botswana Development Corporation (1970), Micro Credit Fund (1999) and Credit Guarantee Scheme (1987). These have failed with businesses struggling to operate and some almost closing down within very few years of operation. Countering failures of these schemes led to eruption of bodies such as Citizen Entrepreneurial Development Agency in 2001(CEDA 2011) and Local Enterprise Authority in 2004 (LEA 2011).

The wakeup call given by the world economic recession to Botswana has also presented a pressing need to diversify its economy to more sustainable and resilient forms. The importance of Botswana looking to SMEs as a response is emphasized as crucial to the economy and employment in Botswana with a speedy diversification

process during the recession seen as advantageous (Africa News, 2009). The BIDPA special briefing on SME Policy presents an estimate of employment status by type of employer in the country with SME sector doing fairly well (Figure 2-1). Medium enterprises contribute far too less than the other two sectors. The current estimate of the number of medium size enterprises stands at 400 – 500 throughout the country (BIDPA, n.d.).
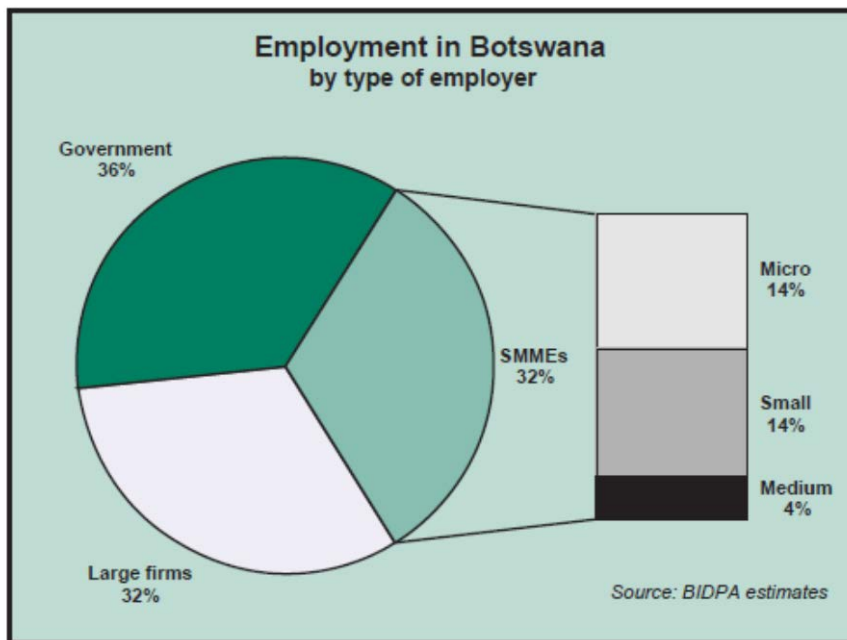
Figure 2-1: Employment in Botswana (BIDPA, n.d.)

Data on SMEs in Botswana about their contribution to economic growth is not precisely available. However, SMEs policy (Government of Botswana, 1999) indicated that SMEs employed 125,000 people including business owners, and contributed 30-45% to GDP (Sentsho et al, 2007). Standard Chartered Bank also started supporting SMEs across Africa and in Botswana (Africa News, 2007) on the basis of their prediction that they will drive sustainable economic growth. Standard Chartered estimates that SMEs contribution to GDP stands between 30% - 60% in Africa (Africa News, 2008). With these colourful projections of SMEs impacting positively on the economy of the country, even cutting across the continent (Africa), it is inevitable that government would not rally behind their development. Government's commitment to

SMEs development in Botswana demonstrates the importance of the sector in the economy of the country. Their growth however will increase environmental concerns if not supported through a sustainability path.

Size and proportion for SMEs in manufacturing

SMEs make up 95% of all companies in Botswana (LEA, 2009). A review of the SME policy by Chandrasekar (1999) shows that of the 50,000 micro enterprises, 25% are in manufacturing. Most of these businesses are being shown located in rural areas, with only 30% in urban areas. A summary of the statistics is provided in Table 2-2 below.

Table 2-2: SMEs in manufacturing

Sector	Number	Rural/Urban Distribution	Manufacturing
Micro	50,000	70%/30%	25%
Small	6000	20%/80%	20%
Medium	300	Mostly in urban areas	Majority in manufacturing

The manufacturing sector as a whole still contributed 4% to GDP by 2009 (Bank of Botswana, 2010). Focusing on looking at sustainability in the manufacturing industry should be deemed imperative as it is expected to be the forefront runner in Botswana's economic development as the country continues to be industrialised.

2.3.   Problems of SMEs in Botswana

Issues noted as challenges to SMEs have been documented and discussed by various authorities. Notable among them are the SME Policy (Government of Botswana, 1999), Temtime and Pansiri (2006) and Temtime (2008). The exhaustive list of problems in the policy have been well categorised as operational and strategic by Temtime and Pansiri (2006) in Figure 2-2. Notable conclusions emerging from Temtime and Pansiri (2008)'s paper show that there is lack of awareness on strategy and plan for long-term competitiveness among SMEs, emphasising the absence of vision, dynamism and innovativeness.

	External operational problems are external to the firm and affect operational efficiency	External strategic problems are external to the firm and affect long-term competitiveness
E X T E R N A L	E.g., death of owner/manager; important employees leaving the firm; unreliable suppliers; high liability; lack of training facilities; extraordinary event like fire or earthquake; forced to leave business premises; local competition; lack of barriers to new entrants; firm product harming someone.	E.g., lack of integrated business development policy; unavailability of skilled labor; changing socio-economic trends; globalization of competition; lack of credit facilities; rapid technological changes; high bank collateral for loan/credit; stringent loan repayment terms; high interest rates on loans.
I N T E R N A L	Internal operational problems are internal to the firm and affect operational efficiency	Internal strategic problems are internal to the firm and affect long-term competitiveness
	E.g., lack of functional planning and budget; ineffective recruitment practices and dependency on family labor; lack of delegation; lack of quality control; lack of financial record-keeping; poor working capital management; lack of effective product/service marketing; lack of information on markets/customers;	E.g., lack of strategic business planning; ineffective human resources policy and procedures; poor financial planning and control; misperception of marketing as advertising; organizational misalignment; lack of participative management; lack of standardization of products
	O P E R A T I O N A L	S T R A T E G I C

Figure 2-2: Problems of SMEs in Botswana (Temtime and Pansiri, 2006)

2.4.   Competitiveness issues for SMEs in Botswana

Sentsho et al (2007) concludes that Botswana SMEs are open to domestic and foreign competition and mostly threatened by cheap imports from imports from South Africa and Asia (Paya, 2006). Regional/global competition cannot be ignored as it is on the increase as a result of changes in technology, freedom of trade and sophistication in communication. SMEs represent a powerful engine for diversifying Botswana's economy. Supporting SMEs has been a proven and sustainable economic development strategy across the world. They could compete if only there were strategies at company level to fully arm them for such especially focusing on supporting innovation through sustainability approaches.

Though some of these competitive aspects are prize related, there are non-prize competitive aspects like product development tools and approaches, marketing, distribution and after sales services (Sentsho et al., 2007). These concerns can be addressed through contextualising product/service development approaches with sustainability as a context. There are further constraints to competitiveness that are especially severe for SMEs in developing countries like the small size of production, quick technological changes, lack of research and development and prohibitive costs of certification and adherence to product and process standards (Egyptian Ministry of Finance, 2004). Although technological change continues to support competiveness of manufacturing companies, competitive edge through decoupling strategies is not technology dependent and can be suitable for SMEs in Botswana where customer focused value co-creation approaches are adopted.

2.5. Sustainability

Generally there are increasing efforts towards social sustainability in Botswana through research institutions targeted to develop affordable and low maintenance ways of living. These are generally projects on renewable energy and locally available materials (Ketlogetswe et al., 2008), development and dissemination of appropriate technologies in Botswana (RIPCO, 2011). Although appropriateness of technologies is usually the intention, this has by far been difficult to achieve. The Botswana Technology Centre building for example, is a passive and low energy building. However there is lack of architectural conceptuality in terms of provisions made for winter in Botswana (Douglass and Frew, 2004). A more contextual approach to the design of the building with more understanding of the local weather patterns in winter would have been desirable. This is common practice not only in architecture but also in manufacturing that developing countries tend to adopt or 'copy' technologies and approaches from the developed world which turn out not to work well in their context (Letsholo et al., 2009).

This is also a position adopted by Moalosi et al., (2006; 2007) who argue the role of design in achieving contextualising interventions. In this way, people and local

18

businesses have ownership and some sense of identity with their products. This dimension has a direct relationship with culture. This is instrumental in light of sustainability. This not only makes local people identify easily with the products but also differentiate them in a unique way in the international market.

2.6. Design and design for sustainability in Botswana

Design in the country is still at its rudimentary stage. Although there are design related companies operating in the country, the overall awareness of value of design for companies and consumers is still low. This is still generally a problem in Africa. Network of Africa Designers (NAD) continues to fight for design recognition in Africa through three areas of collaboration among members as design education, professional design and communication of the activities and design events in member countries (NAD, 2001). The involvement of ICSID in Southern Africa also promotes design awareness. This is done through application of product based approaches of sustainable design looking at improving quality of life in the rural context and reduction of environmental problems through contextual designs that people are likely to use and keep with ease and low maintenance costs (ICSID Africa Regional Report 2003; 2005).

Tertiary education institutions in Botswana offering industrial design courses also contribute to making an impact through collaborative projects and their graduates, although there appear to be only one which focuses on design for sustainability (Moalosi et al., 2010). Sensitising student designers on the impact of design for environment has been the main focus (Kumar and Tana, 2002), with a recently growing focus on how design can make an impact on other dimensions of sustainability (Rapitsenyane, 2011; Molokwane et al., 2009; Letsholo et al., 2009; 2010). A more visible practical impact is yet to be seen in a small industry largely composed of SMEs who cannot afford to hire professional designers.

2.7. Socio-cultural values

Being a former protectorate during colonial times, Botswana's socio-cultural values are now based on shared values across western cultures and the local culture. This gives

the local culture a new definition characterised by learning from one another and where possible merging and convergence of cultural values (Hall, 1996). Fluidity in identity means that successful practices from other contexts existing, new or upcoming can be adopted on the basis of their likelihood of being accepted. Values inherent in product and service innovations for example, embody social contexts for which they have been developed, thus their applicability in a different context requires understanding of socio-cultural values.

In the context of Botswana, Moalosi et al., (2005) developed socio-cultural factors in terms of material factors, social practices, emotional factors and technology/design factors to achieve functional satisfaction and pleasure in using products (Table 2-3). Although these factors are not exhaustive, they provide a reasonable picture of the context in relation to producing satisfaction through products and services.

Table 2-3: Socio-cultural factors of Botswana (Moalosi et al., (2005)

Material Factors	Social Practices	Emotional Factors	Technology/Design Factors
Arts and crafts	Assistance	Beauty	Computing
Baskets	Consultation	Excitement	Electronics
Minerals	Cooperation	Friendliness	Ergonomics
Owning cattle	Democracy	Fun	Hydraulics
Water	Development	Happiness	Mechanisms
	Exchange of gifs	Joy	Pneumatics
	Farming	Kindness	
	Music and dance	Love	
	Respect	Satisfaction	
	Self-reliance	Thanking	
	Sharing		
	Sitting around the fire		
	Sitting under a tree shade		
	Social gathering		
	Storytelling		

2.8. Conclusions

This chapter has provided insights regarding competitiveness issues of SMEs in Botswana. Of all the failed support schemes aimed at supporting SME development, none has focused on design or sustainability. The business management side has been mainly apportioned to these support schemes, with less focus on non-price competitive factors although forming conclusions of why SMEs in Botswana fail. Explicit design and sustainability initiatives in SMEs appear to be non-existent. However, the existence of efforts from tertiary institutions and other players as well as the general concern on non-competitiveness of SMEs in the country is an indication that a high level of interest can be aroused to initiate engagement with sustainability in SMEs. These issues require an understanding of sustainable business development and a broader perspective of design and competitiveness as studied in other contexts.

3 Literature review

In this chapter, a literature review conducted on business innovation in the context of sustainability; product service systems; organisational view of competitiveness; and competitive edge through design capabilities is presented. The central idea is competitive sustainable business innovation through adoption of product service systems and design capabilities. The chapter concludes by demonstrating the need for research, presented in subsequent chapters.

3.1 Introduction

Establishing sustainability and service-oriented innovation in manufacturing companies is continuously becoming popular in various parts of the world and in both big and small companies. This popularity is a result of sustainability being viewed as a source of competitive advantage and differentiation (Shanbazpour and Seidel, 2006). There are various ways of defining sustainability. These vary from economic sustainability, social, sustainability, environmental sustainability and institutional sustainability. In the context of this literature review and thesis, sustainability is defined from the perspective of the often quoted Brundtland definition (1987) and further supported by the perspective of Rogers (1997) on finding a more socially cohesive, economically efficient and ecologically sound ways of producing and distributing existing resources. The social, economic and ecological dimensions are identified in the Brundtland report as pillars of sustainable development to structure the argument of meeting present and future needs.

According to the Brundland Report, sustainable development "is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Report, 1987). A more recent extension of this definition by UNESCO (2005) includes areas which were left out in the Brundtland definition. UNESCO (2005) promotes international resource development that is socially   desirable, economically   viable, culturally   appropriate and   ecologically sustainable. the addition of culture as a pillar to this definition recognises the value of

meeting needs in different cultural backgrounds. While ecological sustainability is concerned with reducing the impacts of development activities on the environment to ensure they are bearable, this should be counter-balanced by ethical improvement of quality of life and a close look at the impact of industrial development activities on both the environment and the society (Hutchins and Sutherland, 2008).

In the context of manufacturing businesses, sustainability means promoting practices that result in less pollution, promote resource efficiency and decouple economic success from economic growth (Evans et al., 2009; UNEP, 2011; Rusinko, 2007). The contexts of developed and developing countries also pose a different dimension to taking up sustainability practices in terms of integrated triple bottom line or a sole economic perspective (Maxwell and van der Vorst, 2004). Unsustainable individual product ownership for economic prosperity and social wellbeing needs disruptive innovation even in developing contexts in order to redefine development in the manufacturing industry. This process of leapfrogging is heavily supported by innovation with intuitive use of information, knowledge, technology, people and governments (Chen and Li-Hua, 2011; UNEP, 2002).

The focus in this literature review is in exploring business innovation in the context of sustainability to challenge inadequacy of currently dominant technological innovations in achieving more sustainability gains and competitiveness. A non-technological and disruptive innovation approach (Product Service Systems) is then explored as a possibility to more sustainability gains and competiveness for manufacturing companies. A capability-based view towards achieving competitiveness is discussed and further explored in the context of design capabilities. This discussion focuses on how use of design capabilities can improve competitiveness of manufacturing companies through supporting them in the transition towards Product Service Systems. Under all areas of this literature review implications for SMEs, and further non-design led SMEs, are discussed, demonstrating the need to support PSS adoption through cultivation of design capabilities in SMEs. The literature review mind map in Figure 3-1 shows topics explored around the central idea of competitive sustainable business innovation and

adoption of product service systems by manufacturers. The value of design capabilities in this idea is highlighted.
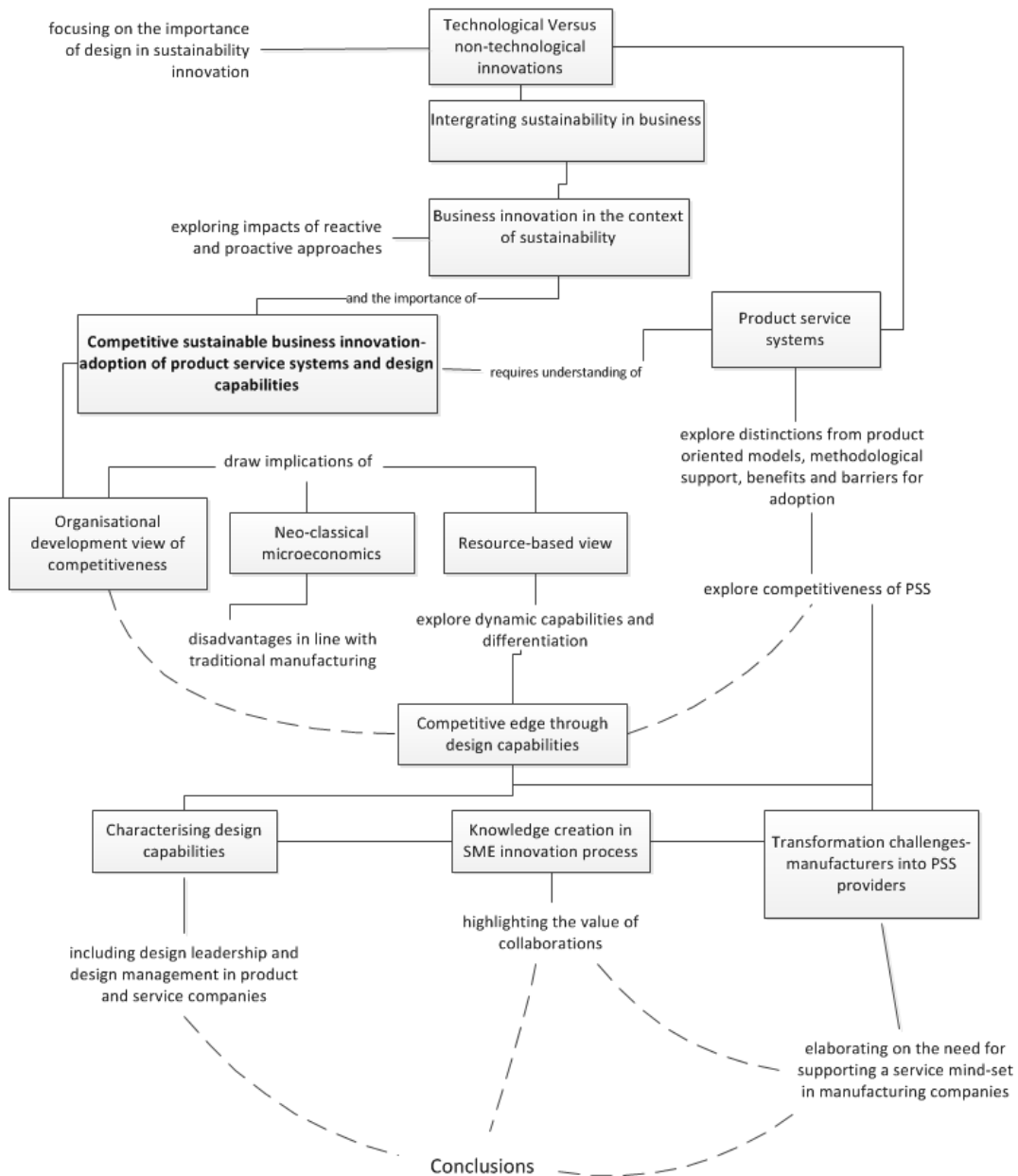
Figure 3-1: Literature review diagram

Figure 3-1 is a mind map of areas covered in the literature. Continuous lines in the figure show how existing relationships between topics have been formed for this literature review. Dotted lines show new relationships that were formed during

literature review and are presented in the mind map as loosely connected concepts that needed to be brought together.

3.2 Business innovation in the context of sustainability

Although innovation can generally be viewed as 'introducing something new', 'a new idea, method or device' (Papalambros, 2009) an extension of how this new idea may be usable is necessary. Such necessary extensions may be when something new enhances user experiences (Kumar, 2009). In the business perspective this means implementation of a creative idea to make a difference in the way user needs are met (Papalambros, 2009). Meeting user needs through business transactions has got a link to sustainability as a broad social goal defined by the relationship between socio-ecological systems and human wellbeing (Molenaar et al., 2010; Parrish, 2010). This is a deviation from the traditional way of measuring innovation success, predominantly in economic ways (Hansen et al, 2009). Innovation has also been measured along environmental lines to increase product usefulness and decrease environmental impacts (Fitzgerald et al., 2006).

3.2.1 Integrating sustainability in business

In business, this integration of social and environmental considerations for economic benefit mentioned above has often been interpreted as the triple bottom line (Elkington, 1998). Although incorporation of sustainability in business can be viewed from both moral and business perspectives (Salzmann et al, 2008), there is often more motivation to do so by businesses if pressure for innovation exists (Hockerts and Morsing, 2008; Preuss, 2007). An elaborate perspective of this argument can be pursued in line with Klewitz and Hansen's framework of sustainability-oriented innovation (2011). Klewitz and Hansen (2011) propose a conceptual framework for what they term Sustainability-Oriented Innovation (SOI) in SMEs bringing together collaborations and networks. In their framework (see Figure 3-2), two ends of a continuum are presented with reactive approaches being driven by regulatory pressures resembling most current practices and proactive approaches on the other extreme being more of radical innovation. In radical innovations input from knowledge

institutions and collaborations are deemed invaluable, demonstrating the importance of knowledge and knowledge co-creation in the innovation process.
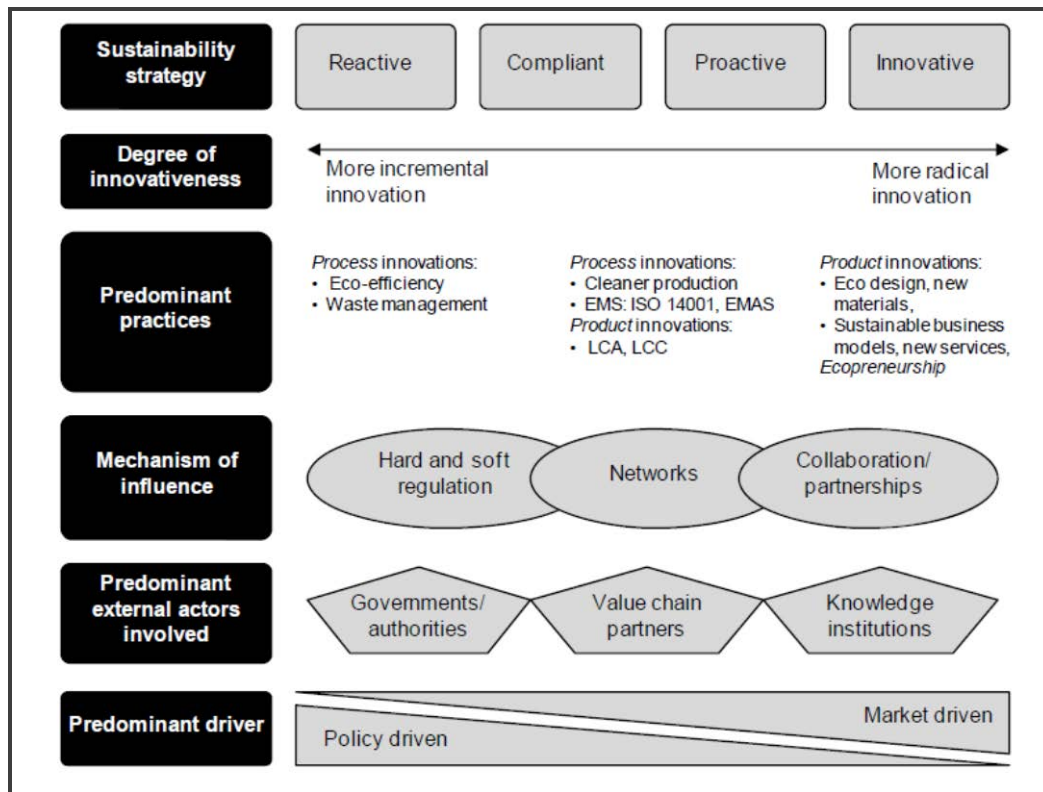
Figure 3-2: SOI Framework (Klewitz and Hansen, 2011)

Though design is not represented in this framework, value of design in this is crucial in exploring process, product, service and system innovations from reactive to more innovative and radical innovations. However, placing ecodesign innovations under radical innovations in the framework may be challenged in light of eco innovation ladder articulating ecodesign at a lower level below functional and systemic innovations (Bhamra and Lofthouse, 2007).

3.2.2   Accounting for sustainability

In business, the triple bottom line is a common way of operationalising sustainability (Elkington, 1994; 1998), and acceptable among business executives (Gray, 2006). It has also been observed by SustainAbility (2002) that most organisations have reported sustainability issues as stand-alone from environmental issues and social responsibility.

Gray (2006) argues that business-case reasons including competition, innovation, reputation, risk management and markets seem to be the motivation for growing reporting on triple bottom line. Although business reasons are the biggest motivation, ecological and social capital are invaluable in attaining economic success and cannot be ignored. Social capital for example is concerned with human resources. Human resources are among those that define competitiveness of an organisation both in the neo-classical microeconomics view and in the resource based view (Barney, 2001). Fichter (2005) gives an overview of different types of capital of a firm (see Figure 3-3), supporting the value of developing all forms of capital for business prosperity. Sustainability improvements across all forms of capital require adoption of a life cycle approach to avoid the rebound effect.

Types of capital		Examples
Ecological capital	Natural resources	Wood, oil, ore etc.
	Ecosystematic functions	Steadiness of climate, reproduktion offlora and fauna etc.
Social capital	Human capital	Competences, knowledge, Know-how etc.
	Societal capital	Efficiency of social institutions etc.
Economic capital	Tangible assets	Fleet, machines etc.
	Equity	Cash reserves, receivables etc.

Figure 3-3: Overview of different types of capital of a firm (Fichter, 2005)

3.2.3 Life cycle approach

Corporate environmental management has by far adopted a life cycle approach dominated by use of Life Cycle Assessment as its main tool (Gauthier, 2005; Klopffer, 2003). This life cycle refers to the physical product life cycle as opposed to market-oriented life cycle (Klopffer, 2008). The life cycle perspective can be incorporated in all elements of the triple bottom line. Improvements following a life cycle approach make clear the benefits made at one stage and ensure they are not overridden by setbacks at

the other, which may make the benefits look insignificant (Klopffer, 2003). A life cycle approach raises sensitivity to impacts of the product development activity in a 'closed loop' system (see Figure 3-4) and encourages resource efficiency as opposed to the linear system often called the materials economy (Alexander et al., 2010). This implies that constraints of product in use and most importantly end of life are accounted for early in the process at the design stage before any commitments of coming up with a product of certain specifications have been made (Bhamra and Lofthouse, 2007). Most life cycle approaches existing support improvements in technological innovations in terms of material products.
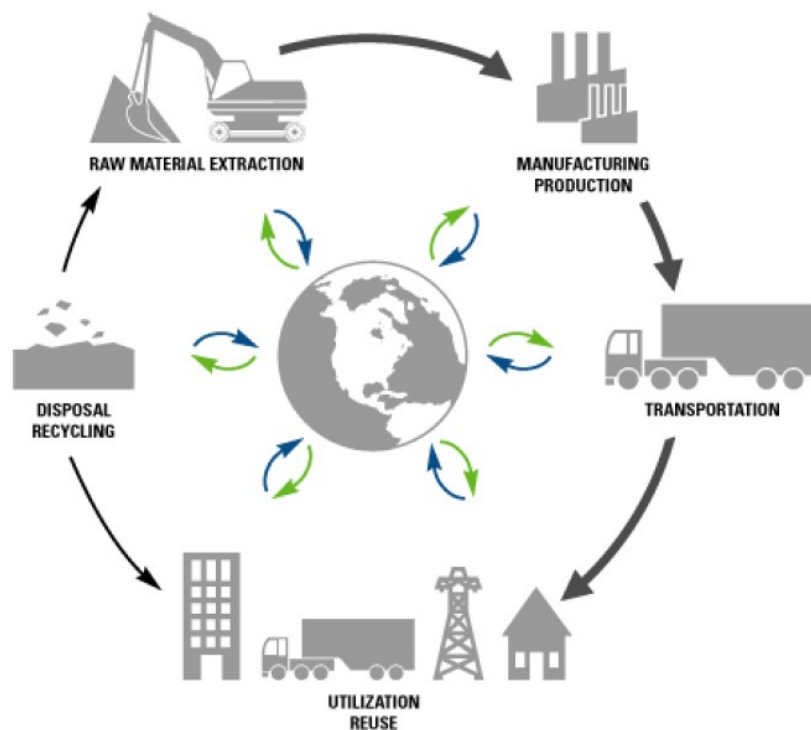
Figure 3-4: Typical closed loop product life cycle stages

3.2.4 Innovation

The term innovation has been used to refer to radical, incremental, really new, discontinuous, imitative, architectural and evolutionary improvements to a product, process, service or system (Garcia and Calantone, 2002). From management studies these improvements are looked with particular attention to the personal, organisational, technological, and environmental contexts within which it takes place

(Wolfe, 1994). A technology perspective on innovation in companies describes it as a process where heterogeneity in innovative performance is caused by a mix of factors such as technological level of the company, market relations and strategies for competition (Kaufmann and Todtling, 2002). This perspective offers insights in the nature of innovation in SMEs whose evidence of innovation is still concerned with process improvements and cost savings because of their low use of technology (Kaufmann and Todtling, 2002).

In terms of developed and developing countries innovation may take different meanings and dimensions. In the context of developing countries, the innovation process is being defined along leapfrogging directions, where other steps are skipped as an integral part of capacity addition for industrialization (Perkins, 2003). This is especially true in technological leapfrogging, where self-innovation is necessary to jump over some stages of technological advancement to new and radical development of competitive technologies (Chen and Li-Hua 2011) that even among the developed nations may still be at rudimentary stages. The authorities differentiate this from 'catching-up'. This they describe as a continuous process by technology latecomers that involves copying or benchmarking against front runners in a bid to catch up with or surpass them. It therefore is a rapid process to shorten time taken to achieve the 'catch up'.

The process of leapfrogging is massively supported by innovation with intuitive use of information, knowledge, technology, people and governments. The above claim is supported by three authorities below whose descriptions of leapfrogging were seen as referring to an innovative way of advancement where in some phases of development are skipped in order to be at state-of-the-art front runner operational level (Hinton 2008; Fong 2009; Chen and Li-Thua 2011). Leapfrogging has been a common terminology in Information Technology (IT), where technology and communication through the use of cell phones have seen many Chinese nationals skipping from non-ownership of landlines to use of cell phones (Kalish, 2005).). In the context of this thesis innovation is defined as an aggregation of the above definitions where a new

product/service mix is introduced in a way that impacts on sustainability pillars described in section 3.1, to create competitive heterogeneity.

3.2.4.1 Design innovation

Design innovation has evolved over the years "…from achieving efficiency to creating desirable user experiences" (Kumar, 2009). In his work, Kumar formulates four principles that he contends lead to successful design innovations. The principles have been summarised to be meaning the following;

1. Where physical products are built, the focus should be on related user experiences. Focusing on user experiences yield radical improvements as opposed to incremental improvements made to the physical product.

2. A broader context of innovation is presented by systems thinking, where interconnected entities of what a product/service is part of are explored and understood.

3. Since innovation involves collaborative work, developing it as a culture for every member of the organisation increases the worth of value proposition.

4. A successful innovation process needs to be planned for and executed using an integrated approach where team members with different expertise can effectively share knowledge and ideas through an enabled sharing working space.

Design innovation in SMEs involving collaborations require the creation of this sharing working space, especially that SMEs generally do not have prior design knowledge yet faced with the need to respond to competitiveness forces. Although Auklin (2013) attempts to look at how SMEs can absorb design knowledge for them to be able to innovate the focus is not on creating sharing working space between collaborators but engaging designers as a way of demonstrating the value of design knowledge to SMEs. The result of her work is a design management approach which does not show a sharing working space of designers and SMEs but a generic design absorption model.

3.2.4.2 Sustainable design innovation

Sustainable design innovation broadens the sole agenda of design innovation beyond development of new products and services to a vehicle for business development (De Eyto, 2010). According to De Eyto (2010) sustainable design innovation agenda seeks to address among others social and environmental considerations, life cycle thinking, social and corporate responsibility, sustainable Product Service Systems, End Of Life considerations, material reclaim, recycling and up cycling, product or service desirability and economic viability. These are considered at different levels from incremental to radical innovation levels. Clark et al., (2009) contend incremental innovation as good for developing economies, which they have coined as redesign and benchmarking. This they claim makes it easy and less costly for the incapacitated developing economies as products and technologies already exist as well as other influential parameters (market and manufacturing information). The cases they look at to support this claim are from Fiji and Costa Rica and focus on material and energy concerns, however both reflecting competitive advantage as one of their aims. The authorities later present contrasting cases to the claim, where radical innovation in Cambodia and Nepal has demonstrated the potential of rethinking in these contexts. Clark et al., (2009) here describe; *"sustainable innovation and design is not necessarily about new technologies, but about rethinking how to meet everyone's needs of sustaining growth without costly environmental and social impacts".*

Different authorities (Sherwin and Bhambra, 2000; Clark et al., 2009; Clune and Ramirez, 2010) refer to a four level model of ecodesign innovation (Figure 3-5). In all the cases ecodesign approaches have been viewed as incremental innovation where the path is easily predictable and is less risky (Clark et al., 2009). The first two phases involve incremental innovation and refer to improvements made to products in favour of the environment from compliance to legislation to increasing reusability of parts, part interchangeability and reduction of energy and materials in products. The next two phases represent radical innovation, which Clark et al., (2009) refer to as new product design and product service systems. Issues that emerge from the authorities' analogies can be summarised as follows, taking into account the case studies also looked at:

1. New product design addresses level 3 of ecodesign innovation model (Function innovation) and presents an opportunity for companies through sustainable design to make breakthrough products and services where in ever-changing consumer needs are addressed with focus on environmental and social concerns. Products/services at this level are contextualised and made more user friendly in terms of usability and cost.

2. Product Service Systems address level 4 (System innovation) and present a big opportunity for dematerialisation as their function based strategy means value proposition is customer satisfaction in place of product value judged by ownership of physical products. In this way, the economic and business value of the proposition becomes high (Kumar, 2009).

3. Any sustainable design innovation should focus on the last two stages/levels for it to make a significant impact and gain a competitive edge in the market (Kumar 2009). A relative model by Charter (1997) has been revised by Sherwin and Bhamra and highlights these areas as 'focus for innovation' (Sherwin and Bhamra 2000).
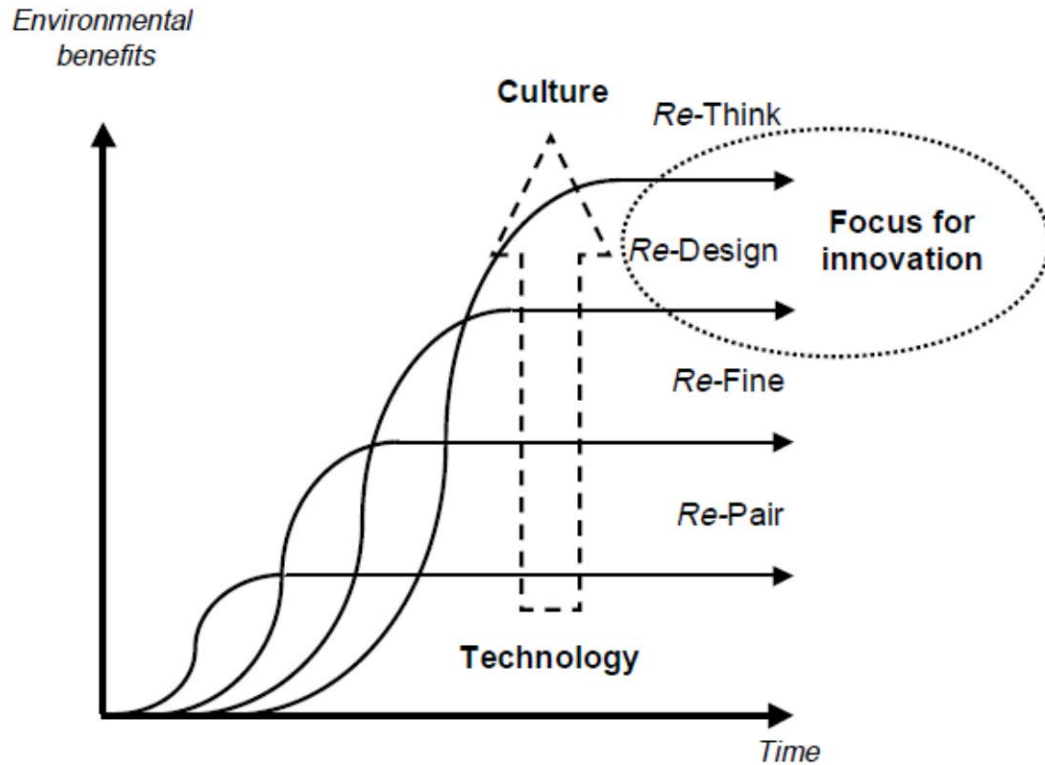
Figure 3-5: Four step model to ecodesign (Sherwin and Bhamra, 1999)

3.2.4.3 Design for sustainability in SMEs

Significant reductions in resource consumption are especially important in a design-led strategy that focuses on design innovation at early stages of raw material needs and design stage, in the upstream part of the value chain according to Huber (2008). Design presents the opportunity for SMEs to approach innovation from a non-price influenced perspective, taking advantage of social capital if invested between designers and SMEs (Arquilla et al., 2009). Promoting sustainability in SMEs through design does not only address environmental concerns but also encourage design innovation as SMEs absorb design culture especially through a relationship with designers. This approach has been used in other countries in Western Europe and in the UK (Pimenova and van der Vorst, 2004; O'Rafferty et al., 2009).

The motivation in taking up sustainability seems to be different in Western Europe and in upcoming economies. Pimenova and van der Vorst (2004) for example observe that while in the UK SMEs see social and environmental responsibility as high priorities, it is

likely to be different for SMEs in upcoming economies still driven by economic needs. In their survey of SMEs in the UK examining the impact and effectiveness of support programmes in the UK, the authorities report social responsibility and caring for the environment as highly prioritised by SMEs. While some success is being reported about current support initiatives in the UK for example, they appear to be making limited impact because of lack of understanding of the broader systemic context (O'Rafferty et al., 2009), which affects the effectiveness of some government-based programmes like Envirowise less frequently mentioned as a source of environmental support, though known by SMEs (Pimenova and van der Vorst, 2004). Key support programmes in the UK like Envirowise and EnviroINNOVATE are also not aligned to barriers and drivers of SMEs towards taking up sustainability (Woolman and Veshagh, 2006) hence offering support takes time as the process always starts with identifying barriers (Pimenova and van der Vorst, 2004). Envirowise's methodology for example attests as presented by Pimenova and van der Vorst attests this problem. The methodology follows for steps progressing as; [1] identifying barriers, [2] producing tools to break them down, [3] delivering these tools, and [4] checking if tools work. These initiatives are also focused on ecodesign with no evidence of focus on product service systems.

An interesting observation made by O'Rafferty et al., (2009) is that these initiatives focus on providing knowledge and information instead of building capacity in SMEs for them to absorb insights and be able to integrate them into company design functions. There are limited studies that look at SMEs absorptive capacity for design. Auklin (2013) looks at how SMEs can recognise design knowledge and apply it where external designers are involved. Although this is a step in the right direction, sustainability issues have not been addressed and it is still unclear how SMEs can operationalize this knowledge.

O'Rafferty et al., (2009) suggest a systems failure framework as a rationale for ecodesign interventions. The authorities argue that for interventions to be successful they should address possibilities of failure at a broader systemic level across factors likely to impact on the intervention. The authorities propose a framework based on

barriers for ecodesign implementation and existing interventions in the UK (Figure 3-6). This systemic outlook of interventions is primarily focused on ecodesign. Very limited support for design and product service systems in SMEs exists. This is the case in both developed and developing countries. This framework could be used to develop a more usable tool to define a design influence in development of competitiveness capacities for SMEs in a PSS context. Categories could be kept generic and issues listed under failure used to interpret items that can fall under each category. An expansion of factors showing what is being addressed can make evolve into an important tool for capacity building in SMEs.

Category	Failure
Infrastructure	Low representation of ecodesign indicators in government R&D programs Low levels of investment in ecodesign related R&D Inadequate numbers of ecodesign support providers Low awareness by firms of emerging ecodesign related issues in key markets Lack of exposure to formal and informal ecodesign education and training Lack of alignment between ecodesign providers and industry Low utilisation of external knowledge providers Lack of support for intermediary organisations to build capacity in ecodesign Unclear market signals and demands
Institutions	Actors can not or will not act due to uncertainty and poor appropriability Competing policy rationales (e.g. environment and innovation) Government information asymmetries "Public-good" nature of investment Lack of policy supply and demand coherence leading to uncertainty and investment inefficiencies Regulators inflexible and too slow to change Regulators lack resources and expertise to address ecodesign issues Time lag between R&D intervention and commercialisation
Interaction and networks	Little structured co-ordination of public-private partnerships or triple helix networks Lack of external support (training, advisory services etc.) to develop ecodesign led innovations Organisational thinness in innovation and ecodesign support Lack of information on potential markets (niches) Limitations of the local markets (too small, low expenditure) Fragmented value chain structures Low levels of collaboration between technology commercialisers, international partners and R&D providers
SME capability	Fragmented product development process in SMEs Lack of managerial and operational resources Failure of managers to harness the strategic considerations Lack of viable technology options or alternatives Lack of awareness of viable technology options Lack of clear internal ecodesign or innovation strategies
Culture	Lack of top management commitment Lack of awareness, training, and motivation of employees Sustainability (environmental and social) viewed as periphery of core business Poor perception of ecodesign by investors Risk averse attitudes and resistance to engaging in new business opportunities through ecodesign Low levels of trust in intermediary and business support organisations Focus on short-term investments

Figure 3-6: Systems failure framework (O'Rafferty et al., 2009)

3.3 Product Service Systems

Product Service Systems is a business strategy that is based on continuous life cycle improvement taking into account the product and service life cycles (Tan and McAloone, 2006). In this way, the concept is representative of a holistic approach to sustainability innovation. Through this strategy manufacturing companies can undergo servitization to redefine value creation in non-product terms (Baines et al., 2007; Tomiyama, 2001). According to Tomiyama (2001) the value of this process of servitization is in intensifying service contents of offers to arrive at environmentally conscious design and manufacturing and create more added values in future advanced societies. A view of the whole landscape of the problem, the environment in which the problem is being investigated, relationships between factors causing the problem and possible factors that might lead to a solution is necessary in this holistic view especially if looked at from the design perspective. A whole system design approach is necessary to aid such decisions (Fiksel, 2006) and move design away from its traditional focus on material products (Morelli, 2003). The position of product service systems in a systemic context can be articulated following definition of service by Tomiyama (2001). Tomiyama (2001) describes service as an activity that requires mainly service channels to deliver and amplify services and service contents to be delivered. This description portrays service as an intangible value that requires an environment, provider, consumer and a product to facilitate its provision (Tomiyama, 2001).

3.3.1 Defining product service systems

The defining characteristics of a system include the problem being investigated, the environment/context in which the system is to be operated, relationships between factors causing the problem and stakeholders and their interactions (Charnley et al., 2011; Saffer, 2006). The characteristics imply cross disciplinary knowledge co creation and problem investigation across the entire components of the system. Whole system design encourages these multi-faceted interactions and relationships to address the problem between different parts as opposed to a linear and single part focus (Charnley et al., 2011). It therefore assumes a life cycle mind set It therefore assumes a life cycle

mind set often targeted at proving functionality to consumers and reducing environmental impacts of doing so (Goedkoop et al., 1999; Tukker and Tishner, 2006).

Product service systems target addressing customer needs through focusing on functions that can lead to customer satisfaction with no environmental and social impacts (Clark et al., 2009). This is well articulated by Mont (2002) described the value of product service system in the context of a functional economy. Mont (2002) justifies the need for service orientation in manufacturing in industrialised countries where 70% of the work force is employed in service industry, and an observed continuously blurring boundary between manufacturing and services. The function focus removes the need for production of a physical product to be owned by the user. Different authorities have defined product service systems (Clark et al., 2009; Fiksel, 2006; Morelli, 2003; Morelli, 2006; UNEP, 2002; Kang and Wimmer, 2009; Ness, 2007; Mont, 2002) based on their focus on satisfying customer needs through the utility they provide. Value is provided through a mix of products and services. This utility focus enables the providers to meet values (knowledge, information, time saving, convenience, comfort, information) to which the market has attached great importance over ownership of physical product (Kang and Wimmer, 2009).

PSS attract customers through their individualised offerings representing their socio-cultural and emotional values. A PSS is therefore a social construction based on goals, results and problem solving criteria which stimulate stakeholder participation (Morelli, 2006). Value proposition is co-produced with clients (Tukker and Tishchner, 2006). The advantage with PSS in this process of creating values is less consumption of resources (Kang and Wimmer, 2009). Values inherent in PSS are either tangible (where customers can calculate financial benefits of choosing PSS over buying and owning a product) or intangible (where customers get satisfaction from the experience of using PSS) (Tukker, 2004). The former is easily measurable and customers can easily see benefits like resource efficiency while the latter is a complex emotional state of customers as pointed out by Kang and Wimmer (2009). This is the case where reductions in resource consumption and generation of waste are contribute in

preservation of quality of life and generation of profits. This accession is represented by Fujimoto et al., (2003) arguing a defining value in terms of a shift from amount of products sold to quality of service the product provides.

3.3.2 Distinctions between **PSS** and product oriented models

Morelli (2003) demonstrates with a case study the shift of the designer's role from design of material products to using new needs and socio-cultural values to re-organise existing products and technological systems. This enables designers to come up with new and resilient offerings that meet customer needs without a pressing need for product purchase and ownership. PSS uses a set of products and services with joint capabilities of meeting users' needs (Morelli, 2003; Manzini, 2006). This primary property of PSS makes material component of PSS inseparable from its immaterial one. This presents an opportunity for customer needs to be met through services with less material components, promoting dematerialisation (Mont, 2002). The case study conducted by Morelli (2003) demonstrates how material infrastructure (workstations with computers, printers, laptops, photocopiers) of a telecentre (a support service for nomadic workers and telecommuters) facilitate functions (printing, surfing the internet, typing and editing documents) that enable customer satisfaction. Following differences inherent in extant literature (Manzini and Vezzoli, 2002; Morelli, 2003; 2006; Tan and McAloone, 2006; McAloone and Andreasen, 2004; Mont, 2002) between a traditional product-oriented model and systems approach, the comparison is shown in Table 3-1.

Table 3-1: Differences between product-oriented models and systems approach

Traditional product-oriented model	Systems approach
Resource optimisation is product based	Resource optimisation is utility based
Stakeholders only care for their interests	There is stakeholder convergence of interests
Optimisation of product manufacture only contribute to eco efficiency	Synergies in profit, competitiveness and environmental benefits lead to eco-efficiency and effectiveness
Stakeholders only optimise systemic processes only within their phase for their own economic benefit	New types of stakeholder relationships/partnerships/collaborations lead to convergence of economic interests
Profit is based on number of product units sold	Profit linked to turn over on the sales of use of the PSS
Disintegrated resource usage means high overall costs at each phase of the system	Fewer systemic resource usage means lower overall costs
Unmonitored product use and disintegrated services during use (often lack of) lead to shorter product life	Product longevity through interconnected series of product and service life cycles

3.3.3 Differences between products and PSS offerings

The differences between product offerings and service offerings can be aligned in similitude to the distinction of PSS and product-oriented models. Following Kang and Wimmer (2009) and Manzini and Vezzoli (2003) the differences between products and PSS can be comparatively made. The authorities use case studies of PSS offerings to make visible the differences turning out to be advantages of PSS offerings over product offerings (Table 3-2).

Table3-2: Differences between products and PSS offerings

Products offerings	PSS
Produced and sold to meet customer needs	Provide access to products and sell product functions instead of ownership
Resource intensive material-based solutions	Value creation from less consumption of resources
Consumption occurs after point of sales	Consumed as they are being co-produced
Owned by consumer/user	Product mostly remain property of the provider
Income made only at point of sales	Regular income expected over a longer period (presents a new profit generation model)
Do not necessarily require local knowledge and can be easily imported	Based on local knowledge and capability, which makes them competitive over product offerings
Mostly technology pushed and disempower communities	Labour intensive thus creating employment
Producer does not have control over life cycle stages that occur after point of sales	Producer in control of life cycle as he is in control of the product

PSS focus on customer satisfaction present a need to re-orient customer behaviour towards them since PSS development demands customer involvement as co-producers (Manzini and Vezzoli 2003; Kang and Wimmer, 2009; Morelli 2003). PSS deliver customer satisfaction or value mainly through three categories according to Tukker (2004) (see Figure 3-7).
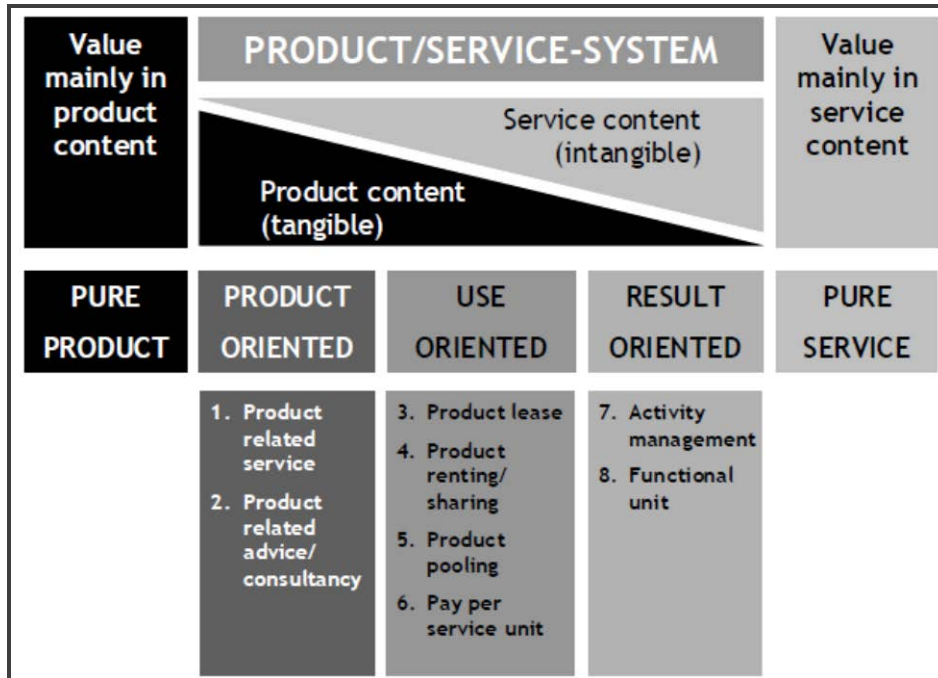
Figure 3-7: Types of PSS

The categories have been named differently by UNEP (2002) and Manzini and Vezzoli (2003) and structured differently by McAloone and Andreasen (2004). UNEP (2002) identify win-win scenarios for the three categories, demonstrating more sustainability and business impacts from services providing added value to services proving final results (Table 3-3). This is perhaps a missing extension in Tukker's descriptive model, however can be aligned with his categories.

Table 3-3: PSS win-win potential

PSS Categories and win-win potential			
Services providing added value to product life cycle	**Services providing enabling platforms for customers**	**Services providing final results to customers**	**UNEP (2002)**
Product Oriented	**Use Oriented**	**Result Oriented**	**Tukker (2004)**
Minimising costs for a long lasting serviceable product (economic)	Maximum use of a given product	Optimisation of use reduces energy and material consumption (environmental	
Design for end of life (environmental)	Fewer products needed for a community of people in a given period of time	Product life extension services (economic & social)	
	Low service provider costs	Application of end of life strategies to components and materials to save on material and component costs (environmental and economic)	
	Product life extension services		

3.3.4 Methodological support for PSS design

A number of methodologies for developing PSS appear to have been developed. Although PSS methodology development is not the focus in this thesis a review of some existing methodological support is important to give understanding to context of use and application of these methodologies. A generic model for PSS design is perhaps difficult to develop considering customers and companies diversities in priority and values (Morelli, 2006). The current PSS models and interpretations are also being challenged (McAloone and Andreasen, 2004) for being based on relative measures of eco efficiency and dematerialisation. They are also being criticised for being isolated and failing to address reasons for poor PSS implementation (Tukker and Tischner, 2006). A whole system design approach is important to consider the user, stakeholders, context

and other factors influencing the system or its parts thereof, in delivering customer satisfaction (Charnley et al., 2011).

3.3.4.1 IPD activity analysis for PSS methodological support

Tan, McAloone and Andreasen (2006) pay attention to activities in IPD process and PSS development to point out issues arising as a result of PSS approach in a product-oriented organisation. They describe characteristics of development activities for PSS approach which need methodological support. These consider two life cycles to be addressed in PSS development; product life cycle and customer relationships life cycle (Figure 3-8). These activities have been identified by McAloone and Andreasen (2004) in their PSS design process support. These activities address product/service development, stakeholders, users and business opportunities. Interactions between stakeholders throughout these activities have been argued by Manzini and Vezzoli (2003) to be needing new design activities and capabilities. The traditional manufacturing approach is linear, thus business ending at the point of sale. The PSS approach is cyclic, with possible business benefits throughout the life cycle.
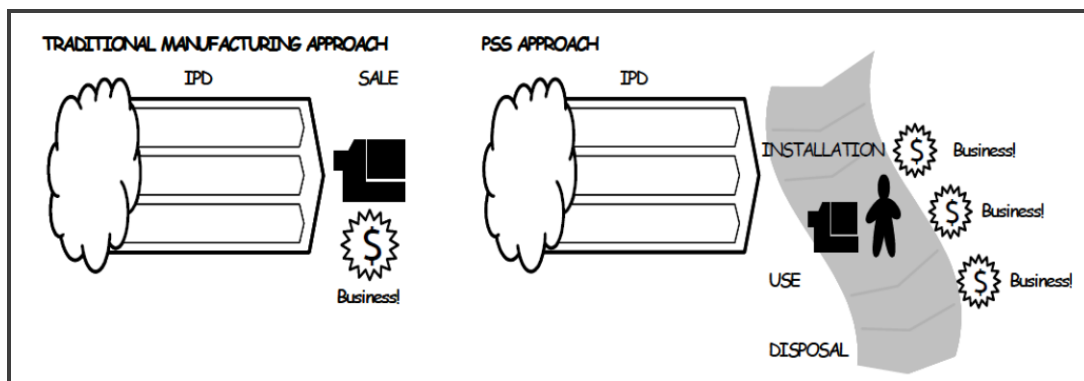
Figure 3-8: Comapring value creation process (Tan et al, 2006)

3.3.4.2 PSS support for solution-oriented partnerships

Morelli (2003; 2006) also investigates a methodology for PSS design recognising industrial production revolution to models addressing individual behaviours and highly personalised needs. Lack of methodologies by design to operate in such a setting is recognised leading to proposal of a methodology based on combining IDEF0

(Integration Definition for Function modelling) with other techniques like scenarios and use cases. A PSS win-in strategy which includes social groups who also may be opposed to the concept of PSS is further suggested. This provides a definition of a broad context in which the PSS is to be developed. Reference is made to Bijker's (1995) set of reference parameters for analysis of relevant social groups. Morelli's tools proposal for use by designers is a positive contribution but does not go further to show the application platform for these tools between designers and companies being transformed into PSS providers.

3.3.4.3 Methodology for PSS

MEPPS was developed to support to companies with methodology and tools to implement PSS as a response to lack of PSS industrial applications. This lack of industrial applications was because of insufficient/false understanding of the PSS concept, lack of success stories motivating more development in industries and difficulties in directing consumer behaviour towards PSS solutions as demonstrated by Kang and Wimmer (2009). Acknowledging this huddle Kang and Wimmer undertook a case study employing MEPSS in a Japanese housing company. The bias use of MEPSS on large companies with less practical application on SMEs makes its suggested universal applicability to both small and large companies unclear. This is further supported by MEPSS's tools intensity (Halen et al., 2005) demanding pre-requisite skills, knowledge, time and diligence to be able to make informed decisions in using the support.

3.3.4.4 Design and ICT methodology for PSS

Other authorities demonstrate how PSS through integration of design and ICT can bring about environmental and social benefits to SMEs when integrated in a strategic way (Hernadez-Pardo, 2012). This was based on findings of research done among SMEs in Colombia on the verge of integrating ICT into their business practice via government project. Case study findings from the research lead to proposal of a business framework to aid understanding of resources and changes needed in developing sustainable PSS.

3.3.5 Benefits for implementing PSS

The concept of sustainable PSS means a PSS has environmental and social benefits as part of its overall benefits (Pardo et al., 2013). This will well-articulated by Mont (2002) and emphasised by Komoto et al., (2005) through their view of PSS for manufacturers as a holistic life cycle approach. Benefits of a PSS in a life cycle approach are illustrated by among others eco design, optimisation of distribution, product customisation, added services, take-back systems, remanufacturing and recycling as part of the solution (Komoto et al., 2005; Mont, 2002; Tomiyama, 2001; Fujimoto et al., 2003). The same benefits of PSS have been discussed without the name extension 'sustainable PSS' by some authors, e.g., McAloone and Andreasen (2004). Another dimension is the questionable sustainability of many successful PSS and the failure of some designed for specific purposes (Tukker, 2004). Despite the above controversy, different authorities have mentioned benefits of PSS as summarised in Table 3-4 below. These benefits are dependent on initial investments like new skills and capabilities of technologies available, thus making PSS a long term beneficial strategy (Martinez et al., 2010) with short-term returns less likely.

Table 3-4: Benefits of Product Service Systems

Benefits	Supporting literature
Increased competitiveness	Besch (2005); Martinez (2010)
Low environmental impacts than product oriented models	Bianchi et al. (2009); McAloone & Andreasen (2004)
Dematerialisation	Hernandez Pardo, Bhambra & Bhamra (2011)
Encourage creating collaborative networks	Sundin et al. (2009); Moreli (2003)
Increased social responsibility	Morelli (2003); Hernandez Pardo & Bhamra (2011)
Intensified product use	Tukker (2004); Tukker and Tischner (2006)
Increased customer loyalty	Tukker (2004); Hernandez Pardo & Bhamra (2010)
High profits	Bianchi et al. (2009)
Savings in time and costs	Hernandez Pardo & Bhamra (2010); Manzini & Vezzoli (2003)
Creates employment	Liu et al. (2010)
Increased value through user experience	Clark et al. (2009); Baines et al. (2007)

3.3.6 Barriers for implementing PSS

Despite potential benefits of PSS many authors have reported on barriers for both SMEs and Multi-National Corporations (MNCs) towards implementing PSS (Table 3-5). Lack of methodological support has widely been argued (Morelli 2003; 2006; McAloone and Andreasen, 2004; Tan, McAloone and Andreasen, 2006), tools developed for some industries (Finken et al., 2013) and the usability of some have been demonstrated (Neugebauer, 2012; Kang and Wimmer, 2009). However there is still no particular approach that focuses on developing capabilities to support manufacturing organisations to cope with the transition to a PSS value creation approach. A PSS blue print for small and large companies however would not work effectively across the two situations, requiring that support be focused on company sizes and motivation for adopting sustainability practices.

Table 3-5: Barriers to PSS adoption

Barriers	Supporting literature
Difficulties of access to finance	Sentsho et al. (2007); LEA (2009); Tukker (2004)
SMEs lack of awareness of environmental impacts of their actions	Hernandez Pardo & Bhamra (2010)
Lack of legislative pressure	Besch (2005)
Definition of relationship between providers and potential adopters	Tan et al, (2009); Bianchi et al. (2009)
Designing methodologies	Bianchi et al. (2009)
Communication support materials for the transition from concept to practice	Liu et al. (2010); Hernandez Pardo & Bhamra (2010)
Difficulty to embed the concept of sustainability into SME business practice	Hernandez Pardo, Bhamra & Bhamra (2011)
Lack of customer demand together with fear of customer reaction	Bianchi et al. (2009)

3.3.7 Competitiveness of Product Service Systems

Literature on PSS acknowledges and mentions that the concept can give companies competitive edge and includes it under benefits of PSS (Hernandez Pardo et al, 2010, 2011; Sundil et al., 2009; Martinez et al., 2010; Besch 2005). What seem not to be coming out clear are indicators of this competitive advantage, though this has evidently not been a focus in any of the studies. An attempt however is made by Tukker (2004) and Meier et al. (2010). Tukker assesses the extent to which a PSS can be a worthwhile investment and gives an analysis of key economic elements of each of the eight PSS archetypical models he identified. The analysis was based on four elements identified as market value of the PSS; production costs of the PSS; investment needs/capital needs for PSS production; the ability to capture the value present in the value chain now and in the future (Tukker, 2004).

Tukker's approach to assessing competitiveness is price related as opposed to looking at non-price factors impacting on competitiveness of companies. Meier et al. (2010) refer to Roy and Chevuru (2010) for their framework on competitive PSS and make a connection between competitiveness and drivers towards PSS in Roy and Chevuru's framework. Based on the drivers (customer affordability; revenue generation opportunity; global competition; technology development; environmental sustainability) acting on the commercial environment, the framework is seen as a key to customer value and business success. The frameworks' inclination towards big companies renders it less relevant for SMEs.

From the client's point of view, what seems to be defining competitiveness is the ability of PSS fulfilling their needs in an integrated and customised way where a unique relationship exists between the provider and the client (Aurich et al., 2010). From the business point of view competitiveness is defined by the firm's ability to create worthwhile value for stakeholders through efficient resource consumption (Baines et al., 2007). Value is determined by user experiences and perceptions and the providers' quality of services and or product offering during value co-creation process (Vargo et al., 2008). A summary of these factors has been provided in Figure 3-9.
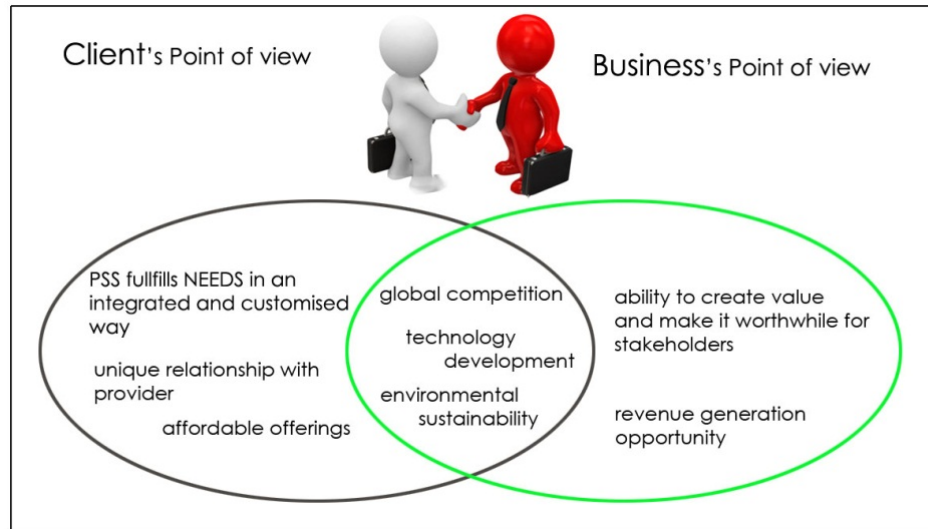
Figure 3-9: PSS competitiveness perspectives

What comes out to be influencing companies' ability to create value and make it worthwhile for customers is relationship learning and absorptive capacity of firms thus leading to competitive advantage or disadvantage (Chen et al., 2009). Relationship learning according to Chen et al. can lead to trust among stakeholders since it is based on their connections that promote shared social experiences. Absorptive capacity is defined in the context of means through which a firm accesses and uses knowledge in terms of recognising and acquiring critical knowledge, understanding and interpretation of acquired knowledge, combination of existing and new knowledge and applying external knowledge to advantage (Cohen and Levinthal, 1990; Chen et al., 2009).

The perspective of relationship learning and absorptive capacity give rise to the importance of knowledge and skills as resources for competitiveness in a PSS (Vargo et al, 2008). Studies on absorptive capacity of companies have resulted in generic models of stages of recognising and applying new knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002). Although these provide invaluable lessons on organisational learning, a PSS perspective means looking at the concept from another dimension. It is less likely that this specific focus can benefit from generic models at company level. A close up of the same concept has been applied to design knowledge as a way of

48

exploring design management potential in SMEs (Acklin, 2013). Although transfer of the concept of absorptive capacity into design management is demonstrated, key capabilities that support each stage are still left to organisations applying the framework.

3.3.8 Differentiation through services

Differentiation strategies can differ between a focus on technology and a focus on the markets; the former based on companies developing unique technologies and applying them in their offerings and the latter addressing user needs and innovation trends. A focus on users and innovation requires a strategy that can drive meeting these needs with increased satisfaction. For manufacturing companies this means redirecting efforts from neo-classical microeconomics view which is dominantly product-oriented (Barney, 2001) and inadequate as it defines value in activities that result in tangible outputs rather than a continuous process in which stakeholders use resources to benefit other parties in the value chain (Vargo and Lusch, 2008); a win-win scenario. The latter has been referred to as service differentiation (Gebauer et al., 2011) and has been increasingly viewed to be "analogous with the shift from a manufacturing to a service economy" (Vargo and Lusch, 2008).

A service differentiation strategy for manufacturing companies means value is now defined in less tangible terms and more in intangible and dynamic services produced and consumed simultaneously (Neu and Brown ,2005; Oliva and Kallenberg, 2003). This strategy makes services the core offering supported by enabling products rather than being add-ons to products as was the case in traditional product orientation strategies (Gebauer et al., 2011). Service differentiation depends on capabilities companies develop over time with their stakeholders (Matthyssens et al., 2006). A stakeholder relationship approach also means that revenue can be generated at different life cycle stages of the offering (Manzini and Vezzoli, 2003; Tan, McAloone and Andreasen, 2006).

3.4   Organisational development view of competitiveness

From management literature, competitors differ in terms of their characteristics, organisation, strategy and performance (Hoopes and Madsen, 2008; Hoopes, Ambastha and Momaya, 2004; Madsen and Walker, 2003). Central to these differences are theories of competitiveness; the neo-classical microeconomics view and the resource based view (Barney, 2001). According to Barney (2001) the former is based on the assumption that resources and capabilities are elastic in supply while the latter acknowledges this elasticity in supply but also argues that some need to be developed over time and cannot be bought or sold. This is a very important perspective towards differentiation since if a company possesses inelastic capabilities, the way it deploys them can lead to sustained competitive advantage (Peteraf, 1993). Since an activity becomes a capability once it has reached a threshold of practice (Lusch, 2007), they will be hard to imitate if developed in the service-oriented perspective in manufacturing companies (Gebauer, Gustafsson and Witell, 2011).

3.4.1   Neoclassical microeconomics view

Basic underpinnings of the neoclassical theory are maximisation and equilibrium. The goal with maximisation is that a company sell as much of its products as possible without making a loss. This is based on the assumption that economic variables are balanced where there are no external influences; a concept termed equilibrium in economics. This view describes competitiveness of a company with regards to inputs and outputs they will procure and produce over time (Nelson and Winter, 1974). Growth in this view is therefore based on a linear process of input, process and output. This includes technological changes made to the product or process of production, with emphasis on price of factors of production (Barney, 2001). Emphasis on price makes resources commodities that can be bought and sold.

The neoclassical view has been the basis of traditional product manufacturing where the product development process is linear and ends at the point of sale (see Figure 3-10). This has been looked at side by side with a cyclic approach (see Figure 3-11) in

section 3.3.4.1 that extends revenue generation beyond the point of sale through continuous interactions between actors.
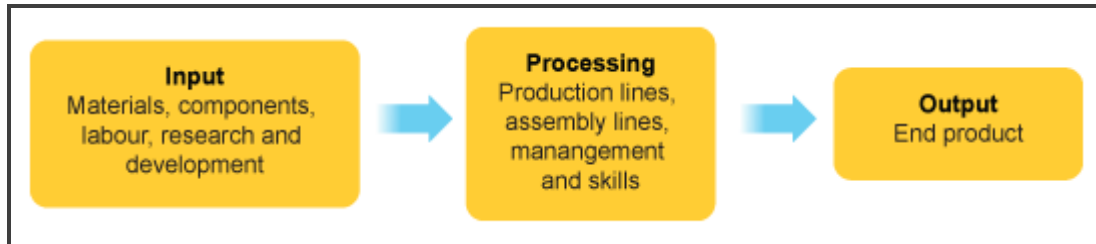
Figure 3-10: Linear value creation process
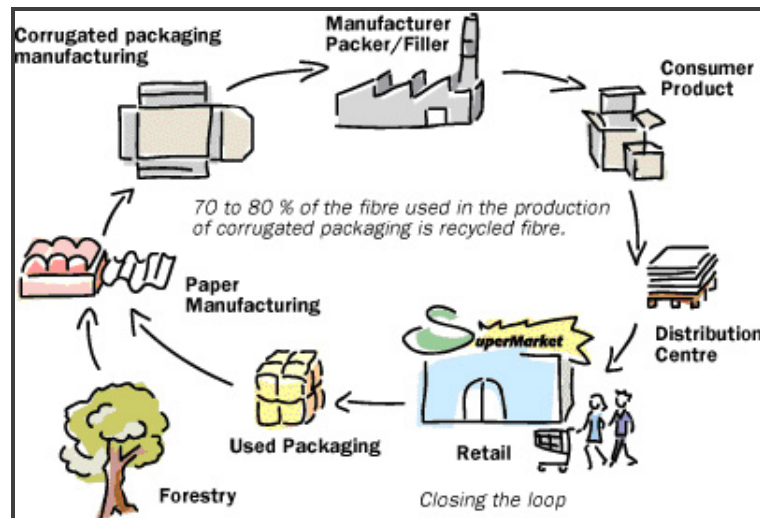
Figure 3-11: Closed loop value creation process

The linear system only explains growth by improvements made in the quality of inputs, processes and outputs, ignoring possible differences between companies in terms of technology, productivity and profitability (Nelson and Winter, 1974). The sole justification of this explanation is based on elastic supply of factors of production, making differences between inelastic factors like people and company characteristics difficult to reconcile (Dierickx and Cool, 1989; Barney, 1991). This inelasticity in supply has been viewed by some as a source of competitive advantage (Peteraf, 1993), hence the resource based view.

A Schumpeter view of competitive advantage based on innovation rather than on equilibrium can be adopted. According to Schumpter (1934) entrepreneurs innovate in order to achieve economic prosperity. Schumpeter argues this along his concept of creative destruction where introduction of new products, services and processes destroy established markets. This is dependent on their knowledge. This dependency on knowledge is also argued by Kirzner (1973) who emphasises the ability of entrepreneurs to be alert to opportunities and take advantage of gaps in the market. Knowledge in this case may be viewed as an enabling capability. Knowledge driven innovation in service oriented situations means that the process is affected by rapidly changing parameters since services are consumed as they are being produced requiring dynamic capabilities (Dawson, 2000; Hoopes and Madsen, 2008). This has been argued through the resource-based view.

3.4.2 Resource-based view

The interpretation of a company in the resource-based view is that it is a collection of assets and capabilities (Hafeez et al., 2002). For a company to be competitive, it has to accumulate these assets and capabilities and deploy them strategically (Gold et al, 2001; Ho et al., 2011). It is generally acknowledged that efforts for organisational competiveness should be targeted at developing dynamic capabilities for the organisation to be responsive and adaptable to change (Dawson, 2000; Eisenhardt and Martin, 2000; Lawson and Samson, 2001; Barney, 1991; Wernerfelt, 1984). Differences in company dynamic capabilities constitute what Hoopes and Madsen (2008) refer to as competitive heterogeneity. Differences in company characteristics need constant innovation for the company to sustain its advantage over competitors. One of the contributing aspects towards this sustained advantage is developing dynamic capabilities. In strategy research, this approach is discussed under the resource-based view (Barney, 2001; Hoopes and Madsen, 2003; Eisenhardt, 2000), where an understanding of how competitive advantage can be achieved and sustained.

The idea behind the resource-based view is to implement strategies for creating value that cannot be easy to duplicate by competitors. For example, the neo classical

microeconomics view has some truth in terms of recruiting experienced human resources, but does not guarantee the development of internal resources and capabilities that need time to be developed (Barney, 2001). The resource-based view recognises this supply and demand point of view, and also urges that development of resources and capabilities occur over time making the supply and demand issue not readily suitable for all resources and capabilities. This is the case for traditionally product oriented manufacturing companies shifting to PSS. PSS's service orientation requires that SMEs develop this capacity, especially working with stakeholders (Gabauer, 2011) and defining new activities and capabilities where the shift is to be facilitated by design (Manzini and Vezzoli, 2003). A focus on developing capabilities can support performance improvement with the least possible resources (Guan et al., 2006) depending on how these capabilities are deployed.

3.4.2.1 Dynamic capabilities

Capabilities comprise of strategic combination of managerial, organisational, and operational routines through which companies can create competitive heterogeneity (Branzei and Vertinsky, 2006; Hafeez et al., 2002). Inputs to capabilities include experience and resources (Eisenhardt and Martin, 2000). Capabilities can be deployed at different levels depending on the targeted level of impact. For example, where tangible and intangible company resources are deployed, this order is known as dynamic capabilities (Helfat et al., 2007). The dynamic part of these capabilities means that they need constant renewal for them to adapt to rapid changes in the business environment (Teece et al., 1997). These different levels of operation imply a hierarchy in capabilities. In the case of existing companies the lower level includes operational capabilities depicting the status quo (Winter, 2003). In a manufacturing company this would mean "producing and selling the same product, on the same scale and to the same customer population" (Winter 2003,p.992). In the dynamic capabilities level the focus is novelty in creating products, services or processes as well as how they are delivered to customers. Hoopes and Madsen (2008) represent these levels in a hierarchical order with inputs to these capabilities shown at the bottom of the hierarchy (see Figure 3-12).
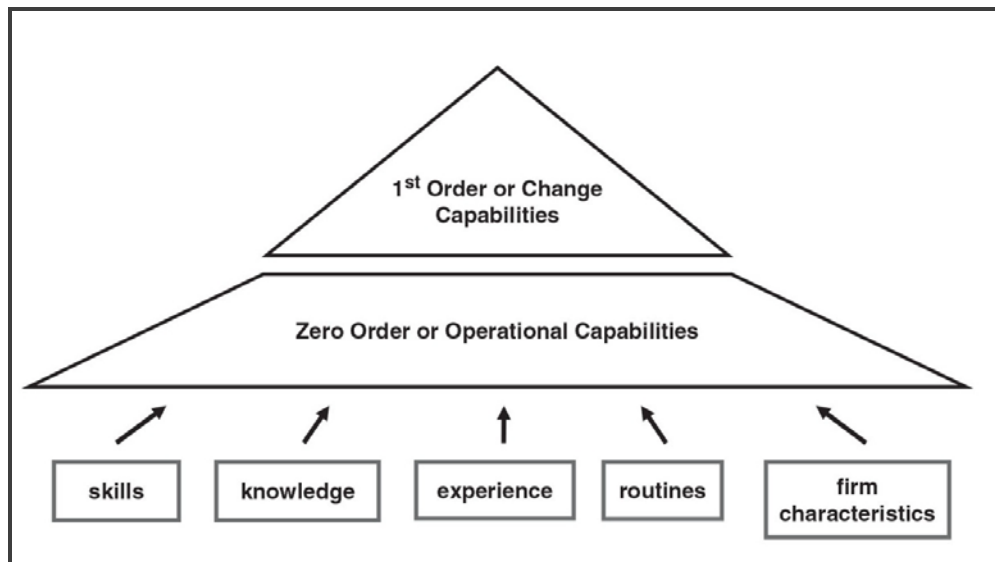
Figure 3-12: Hierarchy of organisational capabilities (Hoopes and Madsen, 2008)

The examination of this hierarchy in this research focuses on development of 1st order capabilities as enablers of servitization of manufacturing companies. The conditions under which operational capabilities in big or small companies may affect the development of its dynamic capabilities can be explored. Constraints under which SMEs in Botswana operate (Temtime, 2008) for example as described in chapter 2 show the status quo affecting competitiveness of these SMEs. A set of ideas on how to approach this problem in a new way (analogous with design mind-set (De Lille et al., 2012)) can provide means through which existing routines (operational capabilities);

- Can be evaluated and enhanced
- Can provide the basis of a need to combine external stimuli (initiatives from competitors, current market trends and socio-economic changes) and develop adaptation strategies through dynamic capabilities (Zollo and Winter, 2002; Zahra et al., 2006).

It could be argued that creating competitive heterogeneity in manufacturing companies through a transition to PSS can be achieved through the dynamic capabilities approach. This could support migration of differentiation through products (operational capabilities) to differentiation through services (dynamic capabilities) in a manufacturing

company. Zahra et al. (2006) conducted a literature review on development of dynamic capabilities especially in SMEs. They observe that most studies have not given attention to the process by which these capabilities develop. This is the case with most PSS literature which has primarily focused on developing tools and methodologies as shown in section 3.3.4. Enabling differentiation in a service context require not only methodologies but also a process with supporting capabilities to promote a positive mind-set towards PSS.

Differentiation and flexibility of dynamic capabilities

As major currencies of differentiation following Hoopes and Madsen's view of competitive heterogeneity (2008), emphasis should be on creating flexibility in attributes of uniqueness. These attributes of uniqueness (see Table 3-6) identified by Harmel and Janda (1994) and Barney (2001) as rare in market, less imitable by competitors and difficult to be substituted, can be lost due to changes in the market place. These changes may be technological or social. An example of such changes is the rise of servitization of manufacturing companies as a sustainable competitive strategy (Besch, 2005; Martinez, 2010).

Table 3-6: Attributes of uniqueness (Hafeez et al, 2002)

Attribute	Description	Example
Rareness	The degree to which a particular capability is distinctive in competition	Sony's miniaturisation capability
Inimitability	The degree to which a particular capability is inimitable by competitors	Honda's know-how in engine design
Non-substitutability	The degree to which a particular capability cannot be replaced by other resources or capabilities	Microsoft's marketing ability in gaining market share based on their operating system products

Building dynamic efficiency to redeploy capabilities can be supported through design in order to aid companies adapt to these market changes. So studies have looked at the relationship between technology and design capabilities and impacts on technology

commercialisation, strategy updates and new developmental directions (Ho et al., 2011; Lojacono and Zaccai, 2004; Ravasi and Lojacono, 2005)). The innovative capability of design has an inbuilt characteristic of adopting new knowledge and ideas (Javnaker, 2000) and interpreting them as business (Mozota, 2006).

3.5   Creating competitive edge through design capabilities

The value of design in the performance of companies has been reported positively by various authorities with varying levels of application. Kotler and Rath (1984) argue the use of design by companies' marketing departments as strategic in matching customers' requirements to product related attributes. A leadership position for design in new product development as argued by Perks, Cooper and Jones (2005) expands beyond traditional design tasks to include direct interface with customers. This role addresses the gap often found between design teams and the marketing departments (Von Stamm, 2004; Topalian, 2002), and extends to helping organisations envision the future, develop and implement strategy and cultivate a culture of innovation (Topalian, 2002). The versatility of designers being able to cover such stretching roles stems from superior design capabilities like interpreting, coordinating and facilitating (Turner, 2000) which designers learn through engagement in different projects, often with different stakeholders. These capabilities are also rigorously cultivated at early stages in their design professions while they are still student designers.

3.5.1   Characteristics of design capabilities

Design capabilities can be found in methods and ways of thinking in the design process. This can be called design thinking after Brown (2008), and expanded to mean some sought of creative intelligence that imagines new possibilities where other people would deem impossible (Gloppen, 2009a). Emphasis is on the process rather than output, meaning that design assumes a leadership position in creating and sustaining innovation in business (Topalian (2002). There emerges interplay between business and design where business learns how to manage the iterative creativity process and design learns how to analyse risks and benefits of creative product, service and system concepts. This view is supported by Silje Friis (2006) through her case study research

studying conscious design practice in international design consultancies. She found that although there were methods and skills from other fields like psychological tools and ethnographic tools supporting strategic design activities, some were distinct to design. A design argument from a vision of possibility point of view is perhaps the key starting point (Margolin and Buchanan, 1995), showing design attitude as an invaluable capability supporting it (Boland and Collopy, 2004). The authorities view design attitude as an enhancer to the quality of analysing ideas from the problem solving process for business consideration. This is a conflicting force to the business as usual mentality based on deciding on existing choices rather than constructing more satisfying solutions.

In light of manufacturing companies as PSS providers, using design for business transformation requires such capabilities as imagination, creativity, innovation, value creation, visualisation, prototyping, human centeredness and future oriented (Gloppen, 2009a; De Lille et al., 2012). However, these alone will not create a long lasting organisational transformation impact if not adopted with a design attitude (Boland and Collopy, 2004). De Lille et al. (2012) call this design attitude mind-set of designers. They describe be as the ability of designers to think of problems as opportunities for creating new possibilities while dealing with uncertainties in dealing with wicked problems. Addressing the uncertainty in profitability of traditional product manufacturers in shifting to product service systems will be key for creating a positive mind-set towards product service systems. Some examples of scenarios where design capabilities have been used are given below.

3.5.1.1 Design capabilities and leadership actions

A panorama of design capabilities in light of leadership through design can be defined in terms of Javnaker's (2000) categories of design leadership at corporate level. Javnaker (2000) identifies six comprehensive categories of design capabilities and related leadership actions to harness design as a strategic tool within a company (see Table 3-7).

Table 3-7: Actions underlying design capabilities (Javnaker, 2000)

Organising Design Capabilities	*Leadership Actions Involved*
Design resourcing capability	Starting up design or development activities. Accessing best suitable design and business expertise. Resourcing money, time, projects, and facilities without detrimental overload of capacity.
Design combinative capability	Configuring design resources. Tapping and connecting to firm specific resources, strategic assets, or otherwise distinctive resources. Creating interaction of design resources and the firm's core competent people.
Design learning capability	Communicating design with ethos repeatedly to multiple stakeholders. Exposing and testing design within a reciprocal and acknowledged design relationship Inaugurating design experiences to key stakeholders Debriefing design building memory
Design innovation capability	Adopting new knowledge and ideas Fostering creative design developments

3.5.1.2 Design management approach to design capabilities

A more user-friendly disposed categorisation of how design can be a strategic tool is offered by Mozota (2006) where these capabilities have been called the powers of design as differentiator; integrator; transformer; and good business. A balanced scorecard approach is adopted by Mozota to demonstrate the value of design to customers (design as differentiator), employee (design as transformer), process (design as integrator) and stakeholders (design as good business) (see Figure 3-13). The usefulness of the model has only been tested in traditional product manufacturing organisations since the focus was on bridging the gap between designers and managers in traditional product manufacturing companies. Figure 3-13 shows a balanced score-card developed by Mozota (2006) to measure the impact of design capacities in organisations in terms of differentiation, innovation process, strategy development and financial gains.
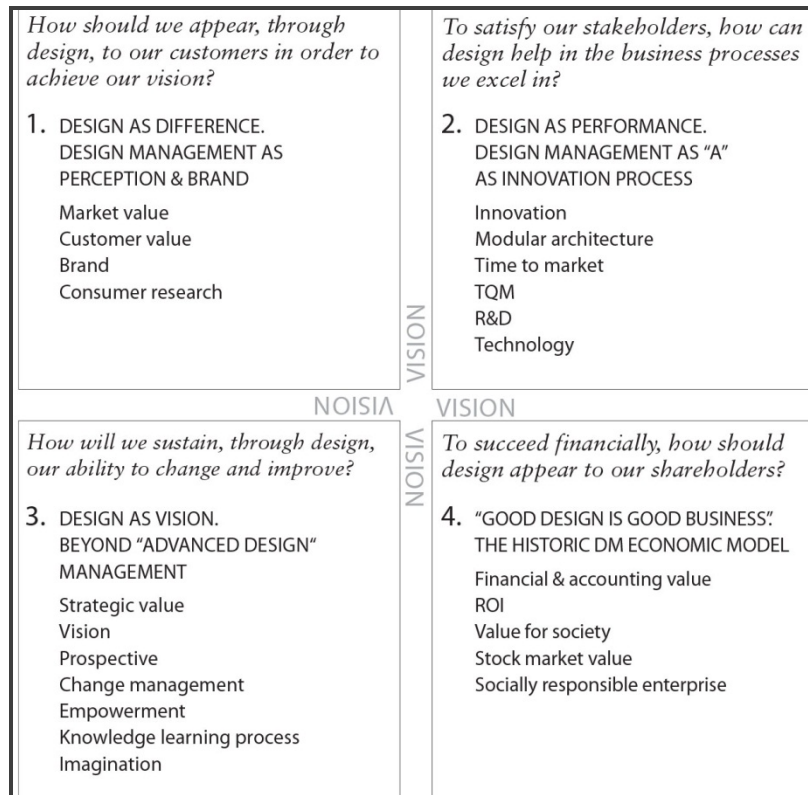
Figure 3-13: Powers of design balanced scorecard (Mozota, 2006)

3.5.1.3 Design capabilities in a service context

Gloppen (2009a) argues the importance of design leadership in contributing to innovative performance of service industries. Design leadership here is argued to provide a roadmap for executives. A design leader would therefore according to Gloppen (2009a) "set the vision of how design could be used within an organisation, selling the vision to, and gaining buy-in from key stakeholders and decision makers". This extension of use of design beyond just products have also been argued by Perks et al. (2005) and Von Stamm (2004) to include an active and direct interaction with customers and marketing departments. In a traditional product oriented setting, the marketing department would usually be responsible for offering services related to the product including advertising and selling it. Using design in business transformation especially in the service industry requires a synergy within the company and its relationships with the outside environment. This spans the role of the designer from developing company visions to the market launch of a product or service (Valtonen, 2007), influencing design of services and experiences.

59

With this changing role of design and the arising need of service innovation in the currently growing service economy, Gloppen (2009b) propose service design leadership represented in Figure 3-14. The motivation behind this figure by Gloppen's was to demonstrate how design can offer processes and methods to leaders of organisations to define a service strategy that can lead effective creation and delivery of service solutions.
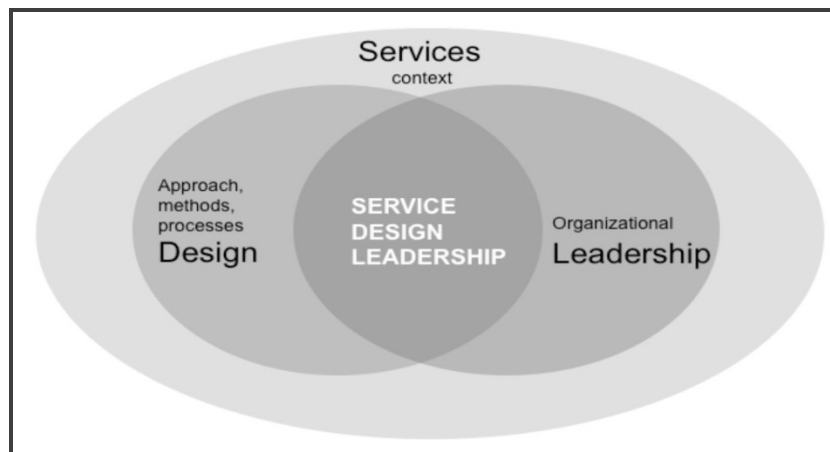
Figure 3-14: Service design leadership (Gloppen, 2009b)

Gloppen's proposal is on the premise of leaders in service organisations understanding and using design as a strategic tool for creating innovative services. The intersection between organisational leadership and design leadership emphasises, from both sides, on envisioning the future (Kotter, 1996; Turner, 2006). The role of design is to turn those visions into reality. The service context comprises of tangibles and intangibles contributed by both design and leadership activities to allow access to services by customers. This description of a combination of tangible and intangible products is the same with Tukker and Tishner's (2006) for PSS. Although Gloppen (2009b) offer an explanation of service design leadership in service industries, it is equally crucial to offer a process that demonstrates the practical application of the concept for manufactures. This is not foreign in Gloppen's work as she also acknowledges the growing shift to servitization (Gloppen, 2009a). Even more needful, is this process for manufacturing organisations whose familiarly with producing and selling services may be limited.

3.5.1.4 Design capabilities in organisational transformation

A facilitative role of design in organisational change is suggested by De Lille et al. (2012). Making reference to the capabilities they propose, they argue building an organisational mind-set that allows practical implementation of design tools. This argument is aligned to Verganti (2009) and Brown (2009) who advocate for the value of design thinking in organisational change. Based on interviews with design consultants involved with supporting companies transform from NPD to PSSD and the change process of Kotter (1995), they propose a process (see Figure 3-15). Although the process suggests that design thinkers should appreciate collaborations and business thinking, it still falls short. For example, according to De Lille et al (2012) the first three stages are supposed to build a design mind-set in the organisation.
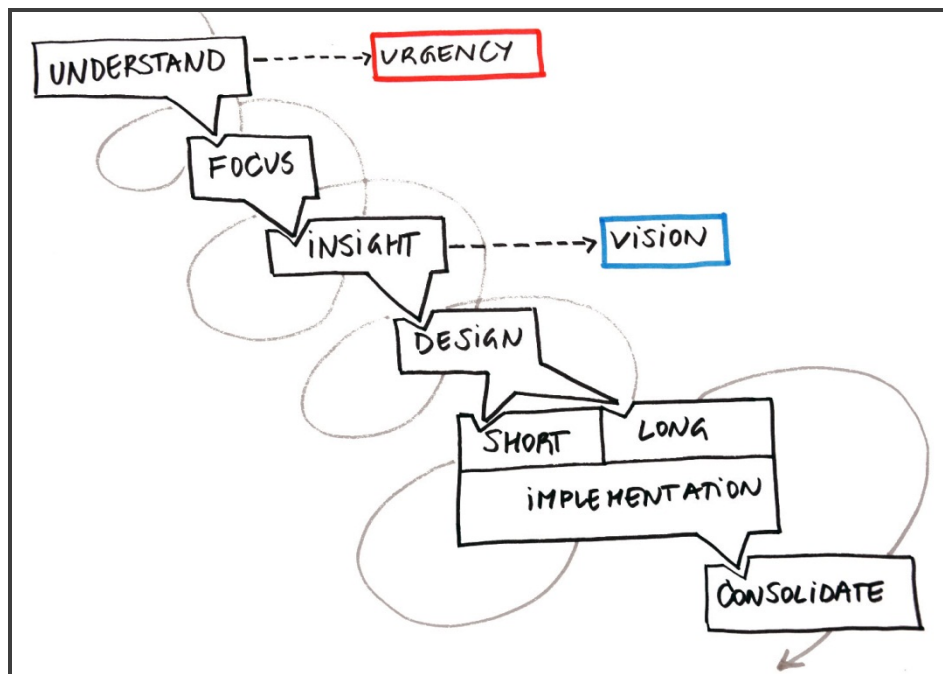
Figure 3-15: Design led organisational transformation to PSS (De Lille et al, 2012)

However, there are no capabilities suggested to nurture this mind-set building process or potential tools that can be used to support the process. This is a very important aspect especially when such issues of transfer of PSS to organisations are to be adequately addressed. Supporting the PSS transfer argument, Cook et al. (2006)

61

identify factors that lead to the successful transfer of PSS to industry in the UK. Although their focus of the transfer is from academia to industry, their analytical framework (Figure 3-16) suggests that some capabilities are required for the process. They use the word competencies which bears a similar meaning with use of the word capabilities in the context of this research. For example under the internal environment; corporate competencies, they emphasise that "competencies for technology/knowledge transfer must exist; particularly those that are required to acquire the PSS concept and its knowledge set from a firm's external selection environment and to assimilate these into organisational structures". Despite the fact that De Lille et al. (2012) do not describe parameters of the external environment in their process, capabilities supporting acquisition of PSS from design consultants along the process have also not been suggested.

> *External selection environment*
>   *Knowledge residing in the external environment*
>   The PSS concept and its requisite knowledge set must be available in the external selection environment of firms; these must be in an accessible form; and a mobility channel must be available to enable the transfer of these from academic circles to industry.
>   *Market conditions facing the firm*
>   The PSS concept must provide a response to perceived changes in the market conditions facing a firm. These include: the need to add value and to attain greater economies of scope.
>   *Legislation*
>   The PSS concept must provide a response to environmental legislation, and in particular, legislation which has been developed to engender extended producer responsibility such as the WEEE Directive.
>
> *Internal Environment*
>   *Corporate competence*
>   Competencies for technology/knowledge transfer must exist; particularly those that are required to acquire the PSS concept and its knowledge set from a firm's external selection environment and to assimilate these into organisational structure;
>   Competencies to apply the PSS concept: those required to use the service type of transaction.
>   *Strategic orientation*
>   The PSS concept must be consistent with the firm's strategic orientation.
>   Firms must be seeking greater differentiation;
>   Firms must be seeking greater economies of scope;
>   Firms must be seeking to attain competitive advantage from compliance with environmental legislation;
>   There must be a corporate commitment to improving environmental performance.
>   *Organisational structure*
>   A structure that can facilitate the acquisition, assimilation and application of the PSS concept.
>   *Product portfolio*
>   High value products from which sufficient revenue can be secured to finance the acquisition of any additional competencies needed for service delivery;
>   Service orientated products in product portfolio;
>   Tangible products could be easily disassembled and upgraded to account for changes in technology and fashion.

Figure 3-16: Attributes of receptivity to product service systems in the UK manufacturing companies (Cook et al., 2006)

Perhaps suggesting capabilities may not be useful for big companies with established design culture or literacy. This may not be the case for SMEs. Lack of design literacy highly prevalent in most SMEs often led to failure of design led interventions (Ravasi, Marcotti and Stiliani, 2008). This lack of design literacy in SMEs often combined with lack of strategy and flexible management styles make interactions between design and management difficult. In light of PSS in traditionally product oriented SMEs with no design literacy, these interactions will especially require enabling capabilities to be defined and cultivated. According to Kowalkowski, Witell and Gustafsson (2013)

infusing the service component in SMEs require developing operational, innovation, relational and networking capabilities. A description of these capabilities was found to be related to Mozota's (2006) four powers of design.

3.6 Knowledge creation in SME innovation process

SMEs have since benefited from short-term knowledge sharing interventions like seminars and workshops in other countries (de Eyto et al., 2008; Blincoe et al., 2009) overcoming such constraints as difficulty of access, time required and necessary expenses. Education and or training towards sustainability develop a positive mind set (de Eyto et al., 2010) essential for SMEs to embrace sustainability in their product development process. Such strategies as seminars and workshops facilitate co-creation of useful knowledge supporting their design activities. Although such interventions are beneficial a sustained relationship with disciplines which can empower SMEs with sustainability knowledge like design is still needed especially in addressing complex systemic problems.

"Knowledge and knowledge co-creation are the key to sustainable competitive advantage in this global network economy" (Kohlbacher, 2008). Sustainability knowledge for SMEs should be co-produced with them in recognition that they are the ones in full appreciation of the problems at hand (Manzini, 2006; Kohlbacher, 2008). In New Product Development (NDP) knowledge co creation requires participation of customers so as to get their view on knowledge embedded in existing forms they interact with (Leonard, 2008).

Collaboration is an ideal way of effective customer involvement to avoid late involvement of customers (Kristensson et al., 2008; Hjorth, 2006; Sigala, 2006; Chen et al., 2005). The natured ability of stakeholders to collaborate through sharing ideas, co designing and shared production enhances their ability to learn current market competition trends and absorb them into their organisations and enhances their versatility to adapt to these changes (Lusch et al., 2007; Blincoe et al., 2009; Spangenberg et al., 2010). Through collaborations stakeholders can discover their

hidden needs through sharing of experiences during a relating process of knowledge co creation (Roux et al., 2006; Lusch et al., 2007). Through collaborations SMEs can be assisted to leapfrog to innovative practices such as product service systems (McAloone and Andreasen, 2004).

3.7 Transformation challenges – Manufacturers into PSS providers

The fact that PSS presents a new business strategy for manufacturers means they need to review their approach to product/service design (Manzini and Vezzoli, 2003). This assignment comes with challenges well-articulated by McAloone and Andreasen (2004), Tan et al. (2009) and Gabauer et al. (2011) including shifting the product development focus from products to activities. This gives design a new role and new focus in defining the position of manufactures in a service economy (Gloppen, 2009a; 2009b). Central to this changing position is involving users as co-creators of value by adoption of user centred approaches in the development process, identifying a PSS business opportunity in terms of product (s) ideal for PSS, developing capabilities required to develop and deliver a PSS and coordination of the entire PSS development and delivery process (Kang and Wimmer, 2009; Morelli, 2003; 2006). Morelli (2006) demonstrates the role of design tools supporting this change in developing scenarios and use cases towards a PSS blueprint.

New opportunities like differentiation through services can emerge from transformation of manufacturing companies into PSS providers (Gabauer, 2011; Vargo and Lush, 2008). This means defining value in less tangible terms and developing services as main offerings rather than add-ons (Gabauer et al., 2011; Kowalkowski et al, 2013). A service mind-set is therefore needful for manufactures, which upsets a technological innovation mind-set through disruptive innovation (Chesbrough, 2007) in terms of product service systems (Mont, 2000). The approach expands sustainability potential in manufactures often limited to product and process improvements (Dillon, 2005), and redefines growth based on non-price factors (Barney, 2001).

The potential of manufacturing companies becoming service providers is further argued by Tan et al. (2009) and further supported by Hansen et al. (2009). Tan et al. (2009) use two case studies of product manufacturing companies to extract two extents of PSS in a manufacturing company; building on the product and its technologies and building on the user and their experiences. The former relates to a scenario extracted from a refrigeration component manufacturing company who came up with a service offering for retailers to detect faults, optimise efficiency and monitoring from centralised monitoring site. The latter relates to a situation extracted from an office furniture manufacturer who turned into a work space service provider with specific customer focus. The benefits in both cases have resulted in intimate customer relationships. The offerings were delivered through establishment of customer-oriented organisations separate from the companies' product-oriented unit with differences in culture and business motivation. The resultant challenges were communication and collaboration. In service organisations communication and collaboration appear to be strengths for enhanced user experiences (Gloppen 2009a; 2009b). An enabling platform to facilitate these collaborations is essential for manufacturers to realise and value of PSS in their business, consequently contributing to resource decoupling.

3.8   Conclusions

The context of this research has been described in chapters 1 and 2 with particular interest in SMEs as sustainable PSS providers in order for them to improve their competitiveness. This project sets to explore a capability-based approach where design leadership and sustainable product service systems can bring a competitive edge for SMEs. Constant innovation has been referred to as a 'life blood' for SMEs which depends on dynamic capabilities to help their effectiveness to change both internally and externally. Despite this acknowledgement and extensive work by strategy scholars on capabilities and competitiveness, there is little guidance to show how this can work The argument of design capabilities contributing to competitiveness has also been limited to product oriented SMEs, or seldom addressed in service oriented organisations.

There has been little focus in developing design leadership capabilities to support PSS adoption, let alone by big companies. Most of the PSS research has focused on developing tools and methodologies to be used with those tools. Even though there is some understanding of capabilities relevant for companies needed for solving user needs through PSS offerings, the path to develop these capabilities is not clear and even not defined, except the knowledge that capabilities develop with use of design tools. PSS value creation activities also require that companies possess certain design capabilities, the development of which has not been identified in the literature. Capabilities necessary for PSS adoption are implied in most works but not explicit such that companies willing to adopt PSS can readily develop them. There is a need to define this trajectory, especially for SMEs for them to consciously develop capabilities to have the capacity to operate as PSS providers. This may support their transition to service-oriented differentiation.

Although demonstration projects with companies for PSS applicability in industry are helpful, they still largely depend on existing company capabilities rather than developing new capabilities. This approach implicitly suggests that manufacturing companies do have necessary capabilities to some extent and only need to define new activities and redeploy capabilities. This makes PSS an even more abstract concept especially for SMEs, even worse for those with no prior design knowledge. There is no link between the dynamic capabilities approach view of competitiveness with PSS literature. This link may provide an understanding of dynamic design capabilities needed to address the mind-set issue of companies towards PSS adoption, to enlighten them to look for opportunities with an open mind of rethinking how user needs can be met. It may be possible that with dynamic design capabilities deployed across the innovation process exploring a rethink approach to competiveness, a PSS strategy can evolve in many non-design led companies.

A lot of barriers for sustainability and PSS adoption include lack of finance especially in small companies. Although strategies like product take back have been suggested and promoted to aid sustainability practices and sustainable PSS development and delivery,

there is no exploration from the perspective of developing strategies for encouraging financially constrained small companies to move towards sustainability and PSS. This barrier needs to be explored alongside the competitiveness benefit of PSS in order to understand why SMEs facing it as one of their major barriers would adopt sustainability and PSS. This understanding could help development of interventions that accommodate the motivation of financially constrained small companies to make the move.

In addition to the above issues, despite the argument on competitiveness of PSS and the role of design in developing PSS there is no conclusive insight into the relationship between competitiveness of PSS and capabilities supporting it, highlighting a gap in knowledge. The aim of this research is to explore effective and contextually appropriate means through which manufacturing SMEs can address their competitiveness needs, through developing design leadership capabilities to support sustainable Product Service Systems adoption. The exploration includes identification of competitiveness priorities in the chosen context of Botswana and the responsiveness of SMEs towards sustainability and PSS as key opportunities for competitiveness supported by design capabilities. The context in which PSS research has been conducted has been mainly in developed countries and big companies. The second research question initiated a series of studies involved in this exploration in a developing context described in chapter 2:

Research question 2 - What are the important factors to be considered for SMEs in Botswana to adopt sustainable PSS as their competitive business strategy?

The evolution of this exploration and subsequent research questions being addressed have been detailed in chapters Four, Five, Six, Seven and eight.

4 Methodology

This research methodology chapter presents the roadmap for this research project and the rationale behind decisions made over the selection of methods and analysis of data, to demonstrate the trustworthiness of the research findings and the project at large.

4.1 Introduction

It is important to select an appropriate research methodology for an investigation to ensure success of a research project. This aids finding theoretical grounds for the research and defining research questions to drive further investigations in subsequent phases. This chapter outlines methodological decisions and justifications underlying this research project. Details on decisions concerning sample, methods and other procedures and data analysis techniques used, taken in each study towards meeting aims and objectives of this research are presented. Issues of reliability and validity are also discussed to support conclusions arrived at in this thesis.

4.2 Research purpose

Setting up what the research intends to find out should be clarified early in the research process. This differs from what we want the results of the research to be as observed by Cohen et al. (2011). The purpose therefore helps the researcher to safeguard against 'fixing' the outcome of the research and provide an idea of the type of information the research should provide. A research can be exploratory – to find out what is happening, particularly in little understood situations; descriptive – to portray an accurate profile of persons, events or situations; explanatory – to explain patterns relating to the phenomenon being researched (Robson, 2002); emancipatory – to create opportunities and the will to engage in social action (Marshall and Rossman, 1999).

Product Service System is an emerging concept for manufacturing companies with little methodological support for companies of different sizes existing. Since PSS is

contextual it is important to understand what companies in the described context do, how they do it and what they think and feel about it and its implications on their competitiveness. The significance of this exploratory research was in the fact that there has been little previous research (Robson, 2011) in PSS and SMEs, let alone micro companies in developing countries. The significance of this research project was in bringing together PSS and design capabilities from the point of view of organisational development. The intent was fostering sustainable competitiveness in micro SMEs with no prior design knowledge. The purpose of this research was therefore to *explore* effective and contextually appropriate means through which manufacturing SMEs in Botswana can address their competitiveness needs through design and sustainable Product Service Systems.

4.3 Research process

The context of this exploratory research was within a case study approach. The case was 'effective and contextually appropriate means through which manufacturing SMEs in Botswana can address their competitiveness needs through design and sustainable Product Service Systems'. The case was further bound to Botswana micro SMEs in the leather industry during the main study, that are members of the national branch support network called Local Enterprise Authority (LEA).

Initial understanding was built through a review of literature, leading to the identification of gaps in knowledge and the development of research questions. With little known about competitiveness priorities of SMEs in Botswana especially where new strategies towards sustainability and competitiveness like PSS are being explored, a Delphi study was used to tease out these priorities from experts. The focus was therefore to build understanding for this case study research through appreciating contextual dynamics. Following on priorities from the Delphi study, detailed understanding of SMEs in the leather industry was sought to aid more focused explorations to address competitiveness concerns. A thematic analysis of data from this process led to development of a success framework at systems level that can

potentially be considered as a way of addressing problems identified and taking advantage of opportunities towards building sustainable and competitive SMEs.

Further explorations in this case study research involved interactions between designers and SMEs in three separate workshops with each company. These explorations were based on the Systems Success Framework developed to explore the value a missing relationship between SMEs and designers in terms of capabilities designers can bring into SMEs innovation process for PSS. The case study concludes with a critical reflection and evaluation of knowledge created during the workshops and outcomes produced. This reflection and evaluation led to synthesis of knowledge produced from the workshops and the guiding framework into a usable process for adoption of sustainable PSS through a design capabilities approach.

An overview of the research process is shown in Figure 4-1. According to Figure 4-1 the study was broken down into four phases, each targeted at addressing a specific objective and contributing to meeting the overall aim of this research project. In phase 1, a literature review was conducted leading to identifying a gap in knowledge. Following this gap, a Delphi study was conducted as a scoping study to tease out issues to begin exploring the gap in a specific context of Botswana. Findings of this Delphi study contributed to the design of a single case study in phase 3, which led to a Systems Success Framework. The Systems Success Framework influenced the design of exploratory workshop protocol and contributed to topics in the discussion chapter. From workshops conducted in phase 4, a design-led sustainable PSS adoption process began to emerge. This was further consolidated during the discussion chapter as the research was being placed in the context of existing literature. The analysis and synthesis undertaken during the discussion chapter led to the evolution of the Design Capabilities for Product Service Systems process. This led to further pulling out main contributions to knowledge in the conclusions chapter. How the aim and objectives have been met is also described in the conclusions chapter.

AIM: to explore effective and contextually appropriate means through which manufacturing SMEs in Botswana can improve their competitiveness through a design driven sustainable PSS adoption approach

Phase 1
Objective 1 — Literature review → Gap in knowledge

Phase 2
Objective 2 — Scoping study → Delphi study

Phase 3
Objective 3 — Single case study → Systems Success Framework

Phase 4
Objective 4 — Exploratory workshops → Design-led sustainable PSS adoption process

Discussions — Synthesis and process evolvement → Design Capabilities for PSS process

Conclusions

Key to Figure 4-1

← Linking objectives to the aim in how objectives have been met in conclusions

⬇ Progression from one phase the next

Progression between phases influencing and shaping main activities and outcomes

Figure 4-1: The research process

4.4 Research paradigm

Social reality can be viewed from various approaches which are either subjective or objective (Cohen et al., 2011). In the former naturalistic research methods are used wherein participants are viewed as helping to construct reality with the researcher. In the latter the researched persons operate independently of the researcher, and the reality which is said to exist is captured through experiments and other qualitative approaches. Silverman (2010) identifies two main paradigms as positivism and constructionism in similitude with Cohen et al. (2011)'s positivism and naturalism. Creswell (2013) uses positivism, post positivism and interpretivism, constructivism, hermeneutics to refer to the same. Positivism is scientific in nature and tends to be inclined to the objective approach of viewing social reality as it depends on accurate reports of what is being researched taken to be implanted inside the heads of participants (Silverman, 2010). Naturalism or constructivism on the other hand tends to be subjective as it depends on dealing with participants directly in their context and social reality can be understood and explained from the point of view of participants themselves (Cohen et al., 2011).

Constructivism was adopted for this research. Constructivism was preferred because issues emerging from literature and insights provided the basis for interactions with participants, in the process building on what exists to arrive at greater understanding of the problem and the co-produced solutions or interventions; a critical realism approach (Walliman, 2006). Informed by literature, this research started with an inductive approach where views of stakeholders (hereafter referred to as participants) were used to build up to conclusions (Creswell and Clark, 2010) defining sustainable PSS adoption priorities for SMEs in Botswana; exploring their competitiveness experiences and perceptions of sustainability and PSS; and exploring a design capabilities approach for SMEs' PSS adoption. This social construction of reality was consistently maintained throughout this case study research even in interpreting and developing meaning of the data (Braun and Clarke, 2006).

4.5 Research type

Research type can be fixed, flexible or as a mixture of the two. The type of research used should enable the researcher to fulfil requirements in the purpose of the research as well as aligned to a philosophical position (positivism or constructivism). Positivist types tend to be fixed and with their experimental designs produce data in numeric forms hence inclined to quantitative research type. Constructivist types on the other hand tend to be flexible with room for them to evolve as data is collected. These produce data in the form of words hence inclined to qualitative research type (Robson, 2011). A multi-type design will include both quantitative and qualitative elements. Quantitative research starts with pre-defined sets of principles and variables (theory) which are to be tested or verified through the research process rather than developed in a very deductive way of thinking (Creswell, 1994). Quantitative designs are likely to yield descriptive numeric data resulting from their statistical data analysis approaches. Qualitative research does not start with any theories since a theory might not be adequate to explain what is happening in the natural environment. It is therefore an inductive approach in which theory tends to emerge as data is collected and analysed (Silverman, 2010). Qualitative designs are likely to yield rich and insightful narratives as a result of data clustering and categorisation in themes and descriptions.

Since the aim of this research was not to test disintegrated competitiveness and sustainable PSS adoption approaches by SMEs, that exist in other parts of the world but co-develop an integrated one driven by design capabilities for micro SMEs in Botswana as a case study, a more qualitative research design was deemed suitable. In order to understand practices of manufacturing SMEs in Botswana and their interaction with people (customers and other stakeholders), resources and profits, a qualitative approach was deemed ideal for this exploration (Flick, 2006). This approach was participatory in nature. Data collection methods involved close human participation with the intention to develop rather than test theory (Walliman, 2006). A qualitative research approach allowed a democratic decision making process with participants (Drake and Heath, 2011) arriving at a contextually acceptable support intervention.

4.6   Research strategy

Research strategy defines how the inquiry was conducted and lays the basis of data collection and analysis techniques (Yin, 1994). The research strategy is best decided on the basis of the type of research questions as well as whether it is a fixed or flexible design (Robson, 2011). Fixed designs adopt experimental and non-experimental strategies with the same overall approach since principles and variables are defined and fixed before the research commences (Robson, 2011; Silverman, 2010).

The three mainly used flexible design strategies are ethnography, case study and grounded theory (Robson, 2011). In addition to these three, Creswell (2013) suggests phenomenology, life history, historical method, clinical research and action research. Ethnographic studies are more concerned with how people live and make sense of their lives in the world they live making it more suitable for research with cultural components. For this purpose ethnographic studies collect primarily observational data (Creswell, 1994). Concerning case study, Robson notes that *"many studies involving flexible designs focus on a particular 'case' in its context and can be conceptualised as case studies. Case studies can follow an ethnographic or grounded theory approach, but do not have to"* (2011, p.79). Case studies are more suitable for exploratory studies, bounded by time and activity where detailed data is collected through various data collection techniques (Creswell, 1994). Grounded theory studies are inclined to addressing lack of theory and concepts with the aim of generating theory as data is collected and analysed during the study (Creswell, 1994; Robson, 2011).

A research study is said to be a case study if the investigation focuses on a contemporary real-life phenomenon in its real context (Yin, 2004). Such investigations can then be used to explore, explain or describe depending on the types of research questions used (Yin, 2003). A combination of for example "what" and "how" questions can lead to exploratory-explanatory designs where the former suggests an exploratory case study and the latter suggests an explanatory design.

It is important to define the case and its units of analysis. Yin (2003) presents typography of case study research with four types of case study designs primarily differentiated between single and multiple case designs (Figure 4-2). Yin suggests that while a case can be an individual, an event, organisation, program or implementation process, a unit of analysis can be defined based on research questions which stipulate what to be studied (Yin, 3003).
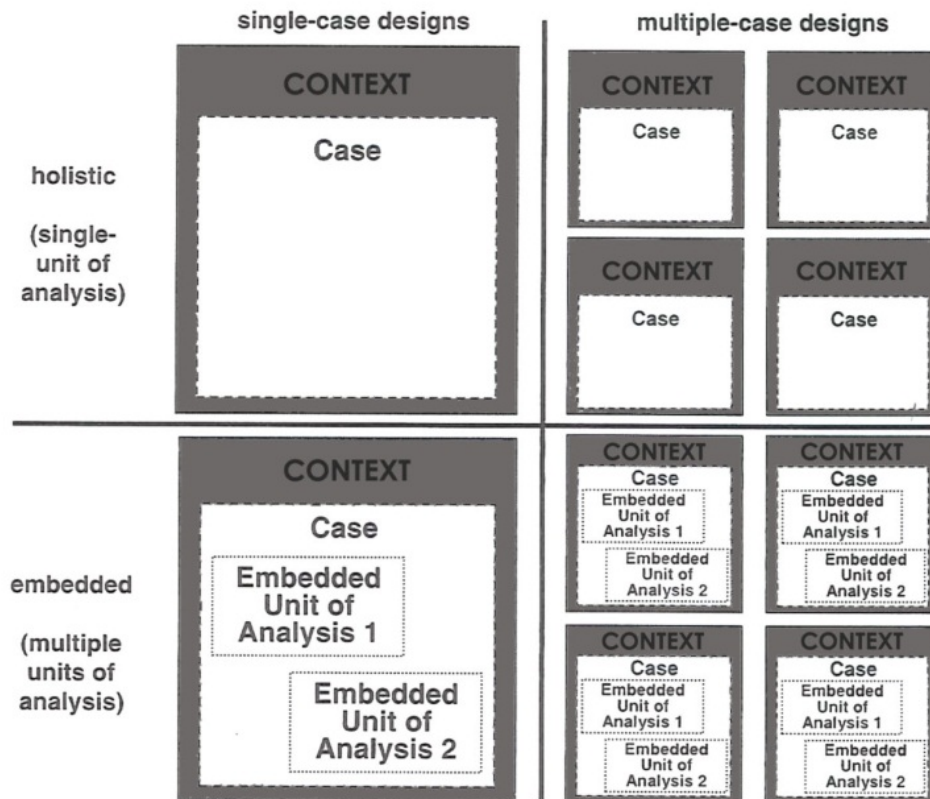
Figure 4-2: Typology of case study research (Yin, 2003)

The purpose of this research as outlined in section 4.2, and the chosen context (Botswana) provided sufficient grounds for this research to be conceptualised as a case study. Further boundaries defining this case study research were typical manufacturing micro SMEs in the Leather industry. The case was looked at in an iterative way involving different data collection approaches at different stages of the research to gain understanding of its multifaceted perspectives.

4.7 Data collection and analysis methods

There are multiple ways through which data can be collected during research. The choice of one over the other is usually a question of the type of information desired as well as who it is to be collected from. Suitability of methods can rationally be decided looking at research purpose, research questions as well as research strategy. In this case study research project, various data collection techniques were used at various phases of the research to answer the purpose of the study and research questions posed at those phases with relevant participants.

Phase One comprised of literature review. The gap in knowledge; an integrated approach of sustainable PSS and design capabilities towards competitiveness in SMEs, from organisational development point of view led to its investigation in the context of Botswana.

The socio-technical nature of PSS and a need to understand competitiveness dynamics of SMEs in Botswana led to a scoping study to inquire of relevant factors to be considered for SMEs in the chosen context (Botswana) with the Delphi technique in **Phase Two.**

Phase Three explored issues raised by the scoping study through a single case with embedded units of analysis (SMEs) to further understand their position and get their competitiveness experiences and perceptions of PSS and sustainability.

In **Phase Four** issues arising from the first case study were explored further through exploratory interactive workshops with selected companies among those who took part in the first case study and sustainable designers. These exploratory workshops were mainly a solution seeking approach to problems identified in phase three and exploring opportunities on sustainability and PSS based on SMEs positive perceptions of the same.

Finally, discussions mainly involved a sense making and synthesis process and placing findings of this research in the body of knowledge. This led to evolvement of a design capabilities-led PSS adoption process called Design Capabilities for Product Service Systems (DeCap PSS) Process, addressing SMEs competitiveness issues arising from data collection and analysis.

4.7.1 Phase One - Literature review

The objective of Phase One was to conduct a systematic review of literature mainly on understanding PSS, sustainable design innovation, sustainability knowledge creation in the innovation process and organisational development view of competitiveness. In order to guide this process a literature review mind map was developed (Figure 3-1). The purpose of the diagram was to brainstorm key topics under the main review areas to enable detailed review and showing relationships across them. Key word searches were used in google scholar, Scopus, web of science and other accessible databases from the Loughborough University library to get information from relevant sources. Keywords in the literature review mind map were used to search the data bases for articles and relevant information.

From the literature review a gap in knowledge was identified. After the gap in knowledge was identified (described in Section 1.3) a scoping study was conducted as the first engagement with participants.

4.7.2 Phase Two - Delphi study

A Delphi study is an approach used to solicit expert opinion in areas and contexts which are still unclear but empirical knowledge needed (Robson, 2011). Little evidence of sustainable PSS as a competitive business strategy for manufacturing SMEs in developing countries required that an informative approach be adopted. Reflections not only on sustainability and PSS, but also on the business environment for SMEs in Botswana were needful to guide this research project going forward.

The Delphi is used in exploratory studies when there is incomplete knowledge of the phenomena being investigated (Hasson, Keeney and McKenna, 2000). The scope of use of the Delphi extends according to Clayton (1997) to;

- A judgement, decision-making or forecasting tool

- Program planning and administration

- Where problems being investigated can benefit from subjective judgements of individuals on a collective basis

- Investigating what does not exist

The use of Delphi technique for exploratory research has various advantages. In this research project it was used for the following advantages:

- It is a group process involving experts through written responses (Delbecq, Van deVen and Gustafson, 1975) which can be independently reviewed and analysed.

- There is guarantee of experts' anonymity as experts do not meet in a round table forum but through coordinated email communication with their identity concealed from each other (Lugwig, 1997). This is important in ensuring dominant members of the panel do not take over and control the consultation process, by so doing suppressing opinions of other.

- The iterative nature of the process allows participants to refine their views as they look across responses provided by other participants from round to round through controlled feedback providing clarity to the phenomena being investigated (Okoli and Pawlowski, 2004).

- Representativeness of group responses can be analysed and interpreted quantitatively despite the small sample size (Okoli and Pawlowski, 2004).

4.7.2.1 The approach

The Delphi study was deemed suitable for the above need. Bringing together the stakeholders in a roundtable forum (focus group) would be a consideration but impractical given the time constraints and travel required for the facilitator and ultimately participants. This was due to different geographic locations between the researcher and potential stakeholders for a focus group. However, focus groups are

also useful in clarifying issues that should be taken further in the next stages of research (Silverman, 2010), in the same way as the Delphi technique can be deployed (Robson, 2011).

In the Delphi technique a consensus about an issue(s) is reached from opinions of a group of experts (Wright, 2007). This is an iterative process usually involving three rounds with both qualitative and quantitative data collection approaches (Loo, 2002). In this research project a traditional ranking type Delphi study was used to collect data (Jaana et al., 2011) on factors relevant for manufacturing SMEs in Botswana to explore sustainable PSS as a competitive business strategy. This was favoured for its largely open ended first round (See Appendix A) to allow participants to express their views as very little was known about the problem in the context of Botswana. The study was conducted to address the following objective and research question.

> *Objective 1* - Identification of factors relevant for manufacturing SMEs in Botswana to explore sustainable PSS as a competitive business strategy
> *Research question 1* - What are the important factors to be considered for SMEs in Botswana to adopt sustainable PSS as their competitive business strategy?

4.7.2.2   Sampling

Particular attention was given to selecting participants as experts since this was not a random survey targeting a large population but one that targeted specific people with specialised knowledge and experience (Staffing et al., 2005). The sample was purposively selected (Wright, 2006; 2007) for their expertise in sustainability and sustainable design, PSS, SME research, practice and policy issues. The selection of participants as knowledgeable experts is critical for the Delphi first for it as an important data collection technique and for its validity (Clayton, 1997; Dalkey, 1969). The panel selected comprised of a non-stratified sample to ensure views representative of various professionals and organisations dealing with SMEs in Botswana (Wright, 2006). Potential participants were selected based on consultations with various organisations like university of Botswana, Ministry of Trade and Industry, Local

Enterprise Authority, Rural Industries Innovation Centre, Botswana Technology Centre and Botswana Institute for Development and Policy Analysis as organisations which focus on SME development and sustainability in Botswana. The consultation process involved meetings with these different organisations and key people were recommended. Invitations were then sent out to those recommended people for them to participate.

Both Clayton (1997) and Loo (2002) suggest a sample size of fifteen to thirty (15-30) experts for heterogeneous population and five to ten (5-10) experts in a homogeneous population in terms of geographic location. Since the purpose of the study was to elicit responses for issues concerning SMEs in Botswana, the sample was homogeneous comprising of people knowledgeable on different issues affecting SMEs in Botswana who are either working with SMEs or have done some work with SMEs in the context of this research. The heterogeneity of the sample in terms social and professional stratifications ensured that a wide spectrum of views (Loo, 2002) on issues affecting manufacturing SMEs in Botswana were represented. The five to ten panel composition was deemed sufficient for this study since the Delphi does not rely on statistical power but on consensus among experts depending on group dynamics (Okoli and Pawlowski, 2004). Following consultation meetings twelve invitations were sent out and nine experts accepted to participate in this study (Table 4-1).

Table 4-1: Sample characteristics and response rate

Number of experts [9]	Professional discipline
1	Business Development Consultancy
1	Research Institutions (SME research)
1	Policy and related issues
1	National Branch Support Network (SMEs)
1	SME practitioner
1	Manufacturing (Industry-academia collaboration)
3	Academia and Research

Response rate	
Round one	Round two
78%	78%

4.7.2.3   The process

Although the Delphi was planned to evolve over three rounds, high consensus rate in Round Two warranted stopping the process. There was also highly distilled information from the first round.

Round One

The first round was a brainstorming session composed of four open ended questions (see Appendix A) where participants teased out important issues pointing to;

- Competitiveness of manufacturing SMEs in Botswana

- Requirements for a transition to PSS in Botswana

- Barriers for a transition to PSS in Botswana

- How barriers can be overcome

A qualitative approach of the first round was deemed ideal to give participants liberty to raise as many issues as they can to allow a holistic understanding of contextual issues in detail since no prior interviews or focus groups were done (Hasson, Keeney and McKenna, 2000). These were fed back to participants in the form of quantitative data through the second questionnaire in Round Two.

Round Two

Round Two involved scoping themes developed during analysis of Round One questionnaire down through a reconciliation process of the ideas gathered from participants. Round one feedback was translated into quantitative items in round two as feedback and reference for the questionnaire (see Appendix B). Round Two items were organised under the three key themes from Round One thematic analysis. These constituted the three Round Two sections of visions, strategies and barriers of PSS competitive advantage for manufacturing SMEs in Botswana. Participants were asked to rate items in order of importance in a Likert scale of 1 to 5, where 1=not important and 5=very important. Participants were given room to review their positions after they have been provided with the general tendency of the group opinions resulting from analysis of the first round questionnaire. There was room for qualitative responses under each section in Round Two to allow participants to express themselves where rating items would have been inadequate for them to do so. The level of consensus reached at the end of round two warranted stopping the process.

4.7.2.4 Data analysis techniques

Analysis of Delphi questionnaires was done between rounds, a process that increases internal validity of a Delphi study (Okoli and Pawlowski, 2004). Late responses were also accommodated where a participant had promised to hand in their responses after reminders and follow up emails.

Round One

Since Delphi round one elicited qualitative data from open-ended questions, results were analysed using thematic analysis following Miles and Huberman (1994); coding, mapping and clustering.

Coding

The coding process began with identifying experts to make follow ups of responses during analysis. Each returned questionnaire was coded as it came in as a way of identifying them (Figure 4-3).

Figure 4-3: Unidentified and identified questionnaires

The data set comprising of all nine returned questionnaires, was coded for themes and sub-themes under key constructs of each question and the research question *'What are the important factors to be considered for SMEs in Botswana to adopt sustainable PSS as their competitive business strategy?'* The coding system emerged as a result of assigning descriptive codes to segments of data as summarising notations. These descriptive codes were applied more interpretively during an inductive analysis process giving words and phrases meaning about their significance in the context of the study (Miles and Huberman, 1994).

Responses were read and reviewed as they were coming in. The reading and reviewing stage was the beginning of the coding process where groups of words or phrases were classified. Side notes were made on the right hand side of the completed questionnaires to deduce meaning from the data during reading and reviewing. These were usually reflections of the researcher about what a piece of data means and pointing out to a possible lead as to where it could belong. This was then followed by coding through highlighting groups of text and writing of codes on the left hand side of the completed questionnaires (Figure 4-4).
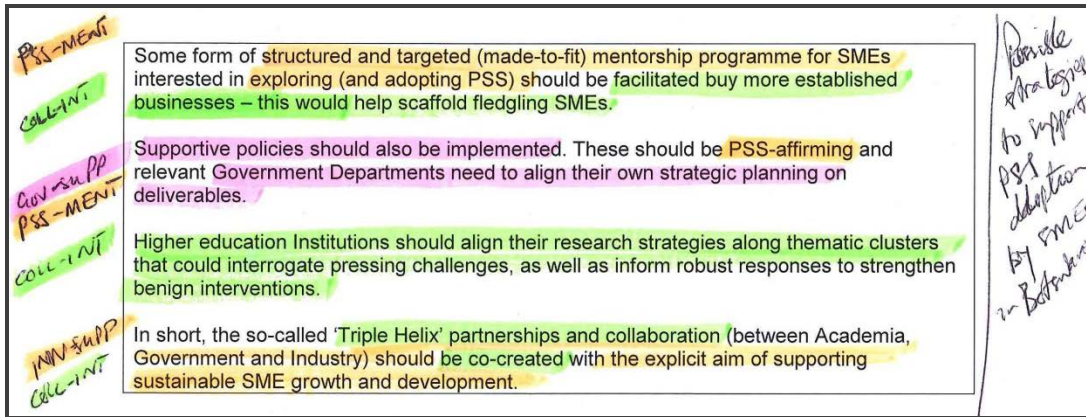
Figure 4-4: An extract of coded text

Mapping and clustering

During analysis data was visualised as a way of reviewing codes and developing categories through the next level of coding called pattern coding (Miles and Huberman, 1994). At this level of coding, more explanatory codes were used as themes began to emerge, pulling together individual codes belonging to the same category. Visualisation of data was done through use of sticky notes of different colours. Categories were represented with yellow sticky notes showing macrocodes under them (Figure 4-5), macrocodes with green showing micro codes with orange (Figure 4-6). These enveloped into more refined clusters as relationships between macrocodes were being mapped.
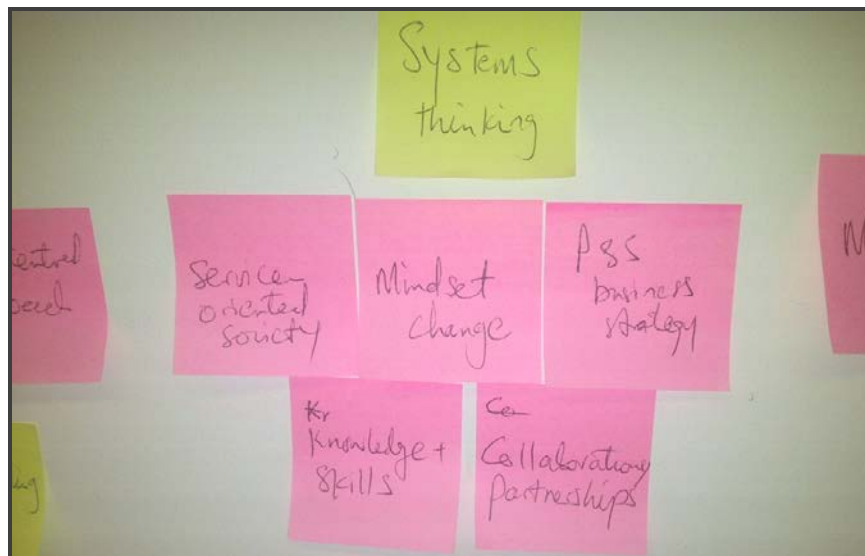
Figure 4-5: Categories/Themes with macro codes

Figure 4-6: Macro codes with micro codes

As the coding system evolved through coding, mapping and clustering, a book of codes was developed to aid coding and clustering. The book of codes was developed following Miles and Huberman (1994). The first column shows a description of categories and codes under them. The second column shows the codes and the third keys each code to the research question which was the basis of the analysis (see Table 4-2). The book of codes was refined during the study to represent the final coding done in the study at the end of Round two.

Table 4-2: An excerpt of book of codes

Category and individual codes	Code	Research question
Sustainability	**SUST**	**RQ1**
Locally available resources	SUST-LAR	1
Cost reduction strategy	SUST-CRS	1
Resource utilisation	SUST-RU	1
Indigenous institutions	SUST-II	1
Design thinking	**DT**	1
Competition	DT-COMP	1
Innovation/Differentiation	DT-INNO/DIFF	1
Systems thinking	**ST**	1
Service oriented society	ST-SOS	1
PSS business strategy	ST-PSS/BS	1
Collaborations/partnerships	ST-COLL/PART	1
Understanding context	**UC**	1
High growth SME industries	UC-HGI	1
Government support	UC-GOV/SUPP	1

The codes were defined as they were being developed during coding. The purpose of defining codes was such that they could be applied consistently throughout the data set since this was a process not accomplished in a day. These were also refined as the study proceeded to give them more focus. An excerpt from the list of definitions of codes is shown in Table 4-3.

Table 4-3: An excerpt of definition of codes

Sustainability – SUST	
Locally available resources SUST-LAR	Promotion of use and identification of locally available resources as mentioned by government policies, practitioners, industry experts and SMEs
Cost reduction strategy SUST-CRS	Ways of reducing manufacturing costs including purchasing raw materials and other costs impacting on the price of the final product
Resource utilisation SUST-RU	Ways of improving efficiency, including identifications of problems and areas which can benefit from resource efficiency
Indigenous institutions SUST-II	Knowledge from indigenous institutions which can benefit the local SME manufacturing, including problems associated with tapping the knowledge

Round Two

Round two results were analysed using descriptive statistics in Microsoft Excel. Analysis of the Likert scale items in round two was the basis of consensus. A five point Likert scale shown in Table 4-4 was used for this analysis. A review of a number of published Delphi studies showed that consensus ranged from a two-thirds majority (Behrens et al, 2006) to >75% (Carnes et al., 2010) and 83% (Armon et al., 2003). With high consensus on a number of issues, a two-thirds majority would make it difficult to distinguish goals and so a >75% consensus was seen as reasonable. Ranking was decided on cumulative percentage of participants who rated an item as important and very important. Evidence of this analysis process is shown in Table 4-5 with two items of question 1 in Section A of Round Two questionnaire (see Appendix B). In the Table A1 and A2 refer to items 1 and 2 in question 1 of Section A of the questionnaire. This range (Hanafin, 2004) was decided upon due to most items being rated from 3 = somewhat important to 5 = very important. The analysis resulted in prioritised goals and strategies for manufacturing SMEs in Botswana to adopt PSS as their competitive business strategy.

Table 4-4: Five point Likert scale used in the analysis of Round Two data

Scale key	Scale items	Meaning of key
VI	5	Very Important
I	4	Important
FI	3	Fairly Important
SI	2	Slightly Important
NI	1	Not Important

Table 4-5: Sample of analysis of items in Round Two

A1: Innovative and sophisticated SMEs

Scale key	Scale items	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
VI	5	3	43%	3	43%
I	4	2	29%	5	71%
FI	3	2	29%	7	100%
SI	2	0	0%	7	100%
NI	1	0	0%	7	100%
	Total	7	100%		

A2: Sustainability and economic diversification

Scale key	Scale items	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
VI	5	3	43%	3	43%
I	4	3	43%	6	86%
FI	3	1	14%	7	100%
SI	2	0	0%	7	100%
NI	1	0	0%	7	100%
	Total	7	100%		

Further analysis of Round Two results adopted a thematic procedure used in round one to cluster goals and strategies into categories. At this stage the aim was to categorise the priorities in distinct thematic areas for them to be investigated during the next phase of the research project.

4.7.3   Phase Three - Single case with embedded units

Phase Three expanded data from the literature review and the Delphi study. Phase three adopted case study design. The purpose of the study was to *explore* competitiveness experiences of leather manufacturing SMEs and their perceptions of

sustainability and product servicer systems. The exploration was set to address the following objectives and research questions.

Objective 2 - An exploration of competitiveness experiences of leather manufacturing SMEs in Botswana and their perceptions of sustainability and product service systems

Research question 2 - What constitutes experiences of SMEs in the leather industry leading to their competitive advantage or disadvantage?

Research question 3 - How do SMEs in the leather sector understand sustainability and product service system?

4.7.3.1   Sampling

The same non-probability sampling strategy described in 4.7.2.3 was used in this study. 18 typical SMEs in the leather sector were selected belonging to different industries. The leather sector was selected in line with the country's National Development Plan 10's economic diversification and entrepreneurship aspect (Government of Botswana, 2011), placing emphasis on SME development with the leather industry as one of priority sectors. The growth and development of the leather sector is targeted to achieve two things (BEDIA, 2006; Government of Botswana, 2013):

1. reduce the import of leather products by supporting and growing the local industry
2. exploit the export potential of leather products from Botswana

This case study was intended to understand the local leather SMEs' landscape in order to explore ways of achieving the first target of the development of the leather industry in Botswana. The rationale for this type of sample follows Yin (2009) with the objective 'to capture the circumstances and conditions of an everyday or commonplace situation' (p.48). Lessons learnt from these SMEs were believed to be representative of other SMEs in the leather sector and would therefore be informative of their competitiveness experiences and perceptions of sustainability and product service systems. Further details about sample characteristics can be found in Appendix C.

4.7.3.2   Data collection methods

Data collection in case study research is done from multiple methods to provide multi-faceted evidence of the case (Yin, 2003; Stake, 1995). Data sources according to Yin (1994) usually include documentation, archival records, interviews, direct observation, participant observation and physical artefacts. These do not necessarily have to be used all in one study but a combination of methods is necessary depending on suitability of one over the other in the study being conducted. The importance of multiple methods of data collection in case study research serves purposes of triangulation confirming validity of the entire study (Yin, 1984; Tellis, 1997). Method triangulation also increases reliability of the data and the data collection process (Tellis, 1997). In this research project the following methods were used.

Interviews

The main platform interviews offer to participants is the opportunity to discuss meaning of their experiences and share their opinions (Creswell, 2013; Denscombe, 2010). Therefore they are useful in seeking facts, behaviour, beliefs and attitudes (Robson, 2011) and measure behaviours and opinions in real time rather than in reported documented formats (Silverman, 2010). For them to contribute positively, it is essential to gain access to people whose knowledge about the phenomena being investigated is vast (Denscombe, 2010).

Impartiality during interviews creates an environment for interviewees to express themselves freely and openly. This approach has been referred to by other authorities as collaborative interviewing (Kvale and Brinkmann, 2009). This emphasises a cordial relationship between the interviewee and the interviewer. Interviews can be structured, semi-structured or unstructured. The differences between the three have been tabulated in Table 4-6.

Table 4-6: Types of interviews

Type of interview	Distinguishing characteristics
Structured	Predetermined questions with fixed wording
	Usually have a pre-set order
	Use both open ended and closed questions
Semi-structured	Interviewer uses an interview guide in the form of topics to be covered or questions
	Wording and order of open ended questions can be modified depending on the flow of the interview
	Unplanned questions can be added to follow up what the interviewee says
Unstructured	Completely informal
	Interviewer has area of interest but does not come with prescribed items
	The conversation develops within the area being researched

A semi structured interview schedule was developed covering questions on product development, sustainability, product service system and business environment reflecting themes identified as priority areas during the Delphi study done during phase 2 of this research. Interview items were also aligned to the purpose of the case study and subsequent research questions. The instrument was piloted among some colleagues leading to minor modifications especially simplifying terminology used to be accommodative to SMEs of varying levels of literacy. This was also equally relevant where questions introducing likely unfamiliar concepts like product service system were posed. Semi structured face to face interviews lasting not more than an hour were conducted for their suitability for exploratory studies where further probing of issues may be useful (Robson, 2011). This type of interviews allowed a rapport to be established with participants to volunteer privileged information (Robson, 2011). It also gave participants room to elaborate further on issues being investigated (Denscombe, 2010).

Observation

Besides asking people about their behaviours and actions a more natural way of learning about them is to watch what they do and how they do it. Observations are useful in exploratory research as means of diagnosis and in subsequent stages to test

insights from data collected (Robson, 2011). These can be carried out as casual or formal activities of collecting data where in the former they are done during field visits while other methods of collecting data are used at the same time and in the latter an observational schedule is developed as part of a study protocol (Yin, 2009).

Conducting observations require that inclusion/exclusion decisions be made about what to observe, in the process excluding some data as irrelevant (Gomm, 2004). The criterion has a bearing on the picture given to the audience about the researched issue (Figure 4-7). These decisions should be framed to address particular research questions (Silverman, 2010) contributing to the overall inquiry of the research project.
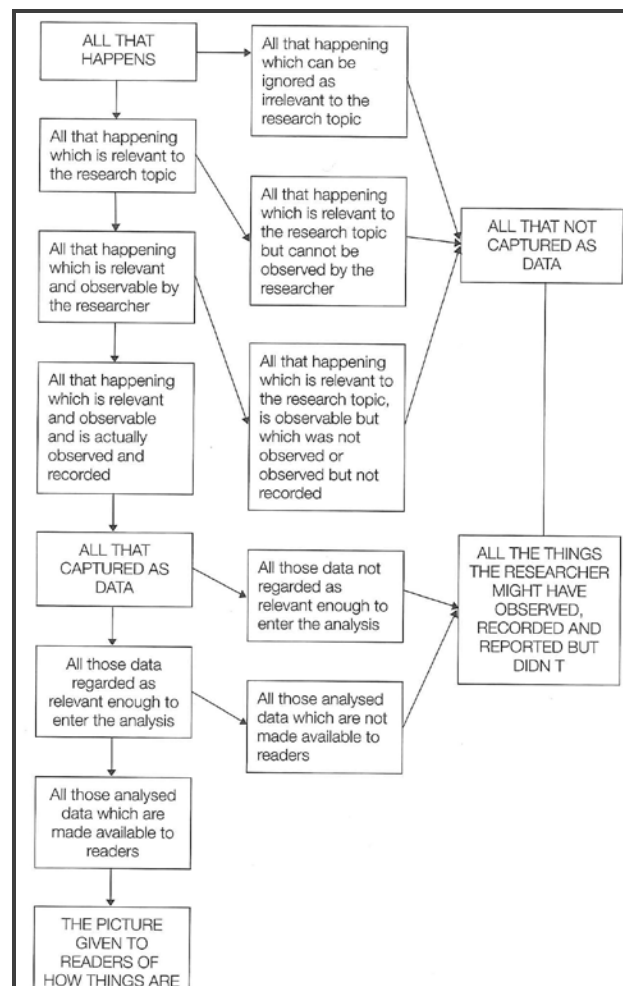
Figure 4-7: What influences whether data is selected in, or selected out? (Gomm, 2004)

During visits for interviews, observations were done to expand the breadth of data collected, complementing the disadvantage of researcher influence during interviews (Gomm, 2004). Gomm's illustration presented in Figure 4-8 influenced what to observe during interviews. Although the interviews were conducted on site, which is where primary business activities were happening, only occurrences related to issues in questions being posed during the interviews were observed. Further considerations motivated by Figure 4-7 were occurrences which the sole researcher could observed and recorded as filed notes. During analysis this data reduction approach continued in terms of what to code and what to leave out. Observations were done unobtrusively and informally (Robson, 2011) so that there was little behaviour and physical changes to the environment. Observations constituted a small component of the study in that attention was only paid to finished products, amount of waste from manufacturing activities and the physical environment (space and suitability for the business). All observations were committed to memory and recorded as descriptive narratives shortly after the interview sessions while they were still fresh in memory.

Documentation

Background information about the leather sector was collected through reports from SME business development organisations, newspaper articles and government policies. All materials were available online, which facilitated review of some documents even before field visits. Availability of these documents in the public domain also meant that permission to use them was not necessary. In addition to providing background information and context to this case study, documents also provided information on issues covered in the interview protocol expanding availability of evidence.

4.7.3.3   Data analysis

Data was analysed using the same approach as in round one of the Delphi study outlined in 4.7.2.4. Additional activities during analysis in phase three largely included memoing since this was a larger data set. Memos reflected the researcher's ideas about the data during coding. These included questioning interesting emerging issues and ideas about relationships and possible solutions to recurring problems in the data.

Memos were also coded to expand categories (Glazer, 1978), building more understanding of events in the case. Since data collection during this study was largely composed of interviews in Setswana, all interviews were fully transcribed in English. A sample a transcription can be seen in Appendix E.

Another modification to the thematic analysis described in phase two was the development of an analytic strategy for case analysis (Yin, 2003). Yin suggests various analytic strategies which can be cherry picked and used as preferred by the researcher (see Table 4-7)

Table 4-7: case study analytic strategies (Yin, 2003)

Strategy	Description
Relying on theoretical propositions	Theoretical propositions or purpose that led to the case study
	Propositions or purpose shape data collection and subsequent analysis
	During analysis only data with some relevance to the purpose of the study is selected and other data are ignored
	Widely used for various case studies
Thinking about rival explanations	Related to the one above but includes rival hypotheses
	Can be used even without theoretical propositions
	Useful in doing case study evaluations
	Researcher attempts to collect data about 'other influences'
	More suitable for explanatory case studies
Developing a case description	A descriptive framework for organising the case study
	An alternative when the other two prove to be difficult to be used
	More suitable for descriptive case studies

Strategies suggested by Yin above become the framework within which data analysis techniques are used to make the analysis process proceed with ease and more meaningful. This enhances both internal and external validity of case study research (Yin, 2009). With the strategy defined, analysis techniques can now be selected to identify major themes within a case (single case study) and look for common themes across cases (multiple case study) (Creswell, 2013).

95

Qualitative data analysis tools are essential to code and categorise large amounts of data collected for example through interviews, direct observations and documentation like newspaper articles and reports. Creswell (2013) suggests an analysis approach for case studies covering several aspects about the case like the context, description, themes, assertions and generalisations.

The data produced in this case study was qualitative. Though qualitative analysis tools were employed for analysis they were used within a framework of an analysis strategy chosen for this case study. Among the three strategies suggested by Yin (2003) and described in the methodology section, relying on theoretical propositions was used as a data analysis strategy. This strategy was chosen primarily because where propositions were not required as is the case with exploratory case study designs, the purpose of the study can be used to guide analysis (Yin, 1994; 2003). Additional advantages for this choice have also been included in the description of the strategy in the methodology section.

> *The purpose of this case study was to **explore** competitiveness experiences of leather manufacturing SMEs in Botswana and their perceptions of sustainability and product service systems*

Guided by the case study purpose, thematic analysis (Miles and Huberman, 1994) was used to handle all data. The purpose of the case study provided key constructs to begin the coding process (Braun and Clarke, 2006). These constructs were *experiences* defined on the basis of what SMEs do, have done or encounter within and outside the company contributing to their competitive advantage or disadvantage. *Perceptions* were defined as what SMEs think about sustainability and Product Service Systems. As more understanding was developed during the initial reading and familiarisation with the data, more perceptions were identified in words, phrases and paragraphs relating to data initially described as experiences. Coding began by initially making summative notes extracting meaning in paragraphs and phrases. Data from interviews, newspaper articles

and field notes from observations contributed in the coding process and ultimate themes.

4.7.4   Phase Four – Exploratory interactive workshops

To explore and experiment with findings and conclusions reached in phase three, an exploratory workshop-based study was developed. Workshops were chosen as a means of engaging SMEs to learn active problem solving and exploration of possibilities (Ebert-May et al., 2011). The motivation to use workshops as an engaging platform was prompted by lack of evidence of exploring possibilities in developing products, evidenced by copying of existing products and unexploited opportunities in relation to design, sustainability and service oriented solutions. This evidence emerged from themes resulting from analysis of data collected in phase three.

Since this was the peak of this research, a very detailed protocol was needful (see Appendix D). Development of the protocol was based on findings from phase three, with the Systems Success Framework developed from these findings used as the main reference. All workshop activities right from the ice breaker evolved around specific findings as follows;

- Activity 1 was intended at building group dynamics and instilling creative thinking and looking for possibilities. This was informed by issues relating to reducing complacency and creating awareness of design innovation under the competitiveness and design themes respectively.

- Activity 2 was intended at interpreting company visions in a service context and was informed by issues relating to increasing innovative responses to threats under competitiveness theme, promote resource efficiency under sustainability theme, developing strategies to cushion material cost under the business environment theme, invest in strategy development and involvement of designers to demonstrate design of services in manufacturing under PSS theme. This was supported by scanning the external and internal environment of SMEs as organisations through the use of PESTEL and SWOT tools.

- ▪ Activity 3 was intended at exploring service oriented solutions by exploring user needs and their involvement in creating value. This was informed by issues relating to promotion of user involvement in value creation under the design theme, and need to expose SMEs to design tools and methods to aid PSS design under the PSS theme. This was supported by using user centred design tools like personas, customer journey maps, and exploration tools like sketching and use of sticky notes.

- ▪ Activity 4 was intended at demonstrating solutions in their entirety including relationships or actors in value creation and delivery and needed resources. This was informed by issues relating to creating structured and coordinated partnerships following identification of weak relationships under the relationships theme, the need to develop clear business intent under the business environment theme and the need for owner/manager's open mind and commitment under the competitiveness theme. This was supported by tools used for activity 3 and use of stakeholder maps to help identify main actors in the PSS value creation and delivery process.

The purpose of the study was to carry out an in-depth **exploration** of how SMEs can recognise and apply design capabilities to distinguish themselves by creating sustainable PSS offerings through interactions with industrial designers. This followed on the need to explore a missing relationship with design/designers as a potential way of addressing SMEs competitiveness problems and develop engagement with sustainability and product service systems. The following objective and research question were addressed through the study.

Objective 4 - To carry out an in-depth exploration of how SMEs can recognise and apply design capabilities to differentiate themselves by creating sustainable PSS offerings through interactions with sustainable designers.

Research question 4 - How can SMEs recognise and apply design capabilities to exploit sustainable PSS potential in order for them to differentiate themselves?

4.7.4.1   Sampling

A purposively selected sample of 3 SMEs in the leather industry belonging to the shoe, furniture and bag industries was used for this study. These three different industries were used in this study in order to observe dynamics in terms of developing PSS offerings and how capabilities are deployed in the process. All SMEs (1) were micro; employ 1 to 6 people including the owner/manager, (2) operate in different market segments, (3) and mostly serve business to business customers but do have business to customer transactions. The sample described in section 4.7.3.1 was used as a sampling frame for these workshops, which is in line with sampling strategies suggested by Yin for exploratory case studies (Yin, 1994). Each SME had its own workshop with 2 SME participants, 2 designers, an independent observer and the researcher as facilitator. A summary of these SMEs' characteristics is provided in Figure 4-8.

Company: SME E

Industry: Furniture
Year established: 2007
Highest qualification: Proficiency certificate in leather works
Number of employees: 2, including owner/manager
Main product: Office furniture
Main projects: Re-upholstery of old furniture
Main market: Business2Business

Company: SME I

Industry: Footwear
Year established: 2006
Highest qualification: Proficiency certificate in leather works
Number of employees: 4, including owner/manager
Main product: School shoes
Main projects: Supplying local councils for orphan students
Main market: Government

Company: SME B

Industry: Fashion bags
Year established: 2006
Highest qualification: Degree in Design & Tech Education
Number of employees: 6, including owner/manager
Main product: Ladies' fashion bags
Main projects: Supplying curio shops
Main market: Business2Customer

Figure 4-8: Workshop participant SMEs

4.7.4.2   Data collection

Data was collected through site visits, workshops and interviews involving co-owners who in all the cases were directly involved in the running of the business. Data was also collected from designers at the same workshops and through interviews following the workshops. In total six site visits were conducted, with one half day workshop conducted between the visits for each company.

Interviews were conducted during the second visits. Five semi-structured interviews each lasting for up to 45 minutes were conducted two weeks after the workshops mainly to evaluate experiences of the participants from the workshops and their reflections about future potential of PSS in the case companies following on ideas developed during the workshops (see Annex 8 in Appendix D). The interview guide was developed based on workshop outcomes of the observation schedule in Figure 4-9. This was intended at getting feedback from SMEs on how they progressed through each task and where they needed more assistance. From these observable behaviours described in Figure 4-9, SMEs were also asked of the demands in PSS development facilitated by design after their direct interactions with industrial designers.

Design and Product Service Systems workshop for SMEs

Observation schedule   Date:..

Behaviours to be observed across activities and their outcomes

independent behaviours: how are group members getting on, on their own?
dependent behaviours: where did group members request assistance? how was it offered? how was it accepted?
independence-supportive behaviours: how group members encourage each other and how they discourage non-attempts to engaging on tasks
dependence-supportive behaviours: are designers doing everything and helping SMEs with everything without giving them a chance to have a go? do designers discourage SMEs to equally engage on tasks with little or no guidance from them?

company name:
main product:
observed by:

Activity:

task	behaviour	consequence

outcomes and strategies

Loughborough University

Figure 4-9: Observation schedule

This included interviews with designers. Other supporting information about the cases included newspaper articles and photographs of their current products. This

combination of sources offered triangulation, ensuring reliability of findings. A summary of methods is provided in Table 4-8.

Table 4-8: Data collection methods used in phase 4

Methods	Data collected	Source
Document analysis	Background data on companies, their visions, products and markets	Company profiles, newspaper articles, photographs
Workshops	Dissemination of capabilities by designers and reception by SMEs	Designers and participant SME owners/managers
Interviews	Evaluation of the workshop and follow up on planned action	Participant SME owners/managers and designers

Documents and interviews were used as outlined in section 4.7.3.2. The workshops were the second main data collection tool used in this case study following the study described in 4.7.3, and their use is described below.

4.7.4.3   Background to Workshops

The purpose of the workshops was to *explore* how SMEs can recognise and apply design capabilities to differentiate themselves by creating sustainable PSS offerings through interactions with sustainable designers. Through these interactions with designers, SMEs were exposed to design capabilities in a conscious process of developing PSS offerings. A protocol was developed (Appendix D) outlining, the activities, resources and time commitments. Since this was an exploratory study, activities mainly involved discussions (Barlour, 2007) between 2 SME participants and 2 designers. Observations were made of group dynamics and interactions between participants provided additional data (Flick, 2009). This setting was key to allow participants to check and balance others' opinions (Robson, 2011), especially where new concepts like design, sustainability and Product Service Systems were being advocated for.

Figure 4-10: Typical workshop setting during discussions (Workshop study held with SME B)

4.7.4.4   Data analysis

The same data analysis procedure described in 4.7.3.3 was adopted with the additional component of cross comparison and analysis of workshops also described in the same section. Data gathered for each workshop was transcribed and analysed in N-Vivo. All data sources transcribed outside N-vivo were also loaded and labelled in identifying folders. Memoing took place throughout the analysis. Data sources and memos are shown in Figure 4-11. The purpose of the analysis was to explore interactions between designers and SMEs and the resultant outcomes. Workshop activities were targeted at overcoming barriers to service-oriented differentiation as a way of developing competitiveness heterogeneity, and utilising opportunities for design and sustainable Product Service Systems identified in phase 3. The analysis of the approach towards servitization was from the perspective of each SME. The analysis approach identified themes and patterns within and across workshops following a coding scheme of developing nodes from the analytic objective. Six themes and further relationships across them were identified. Figure 4-12 shows the hierarchical structure of nodes in N-Vivo, showing themes, macro and micro codes.
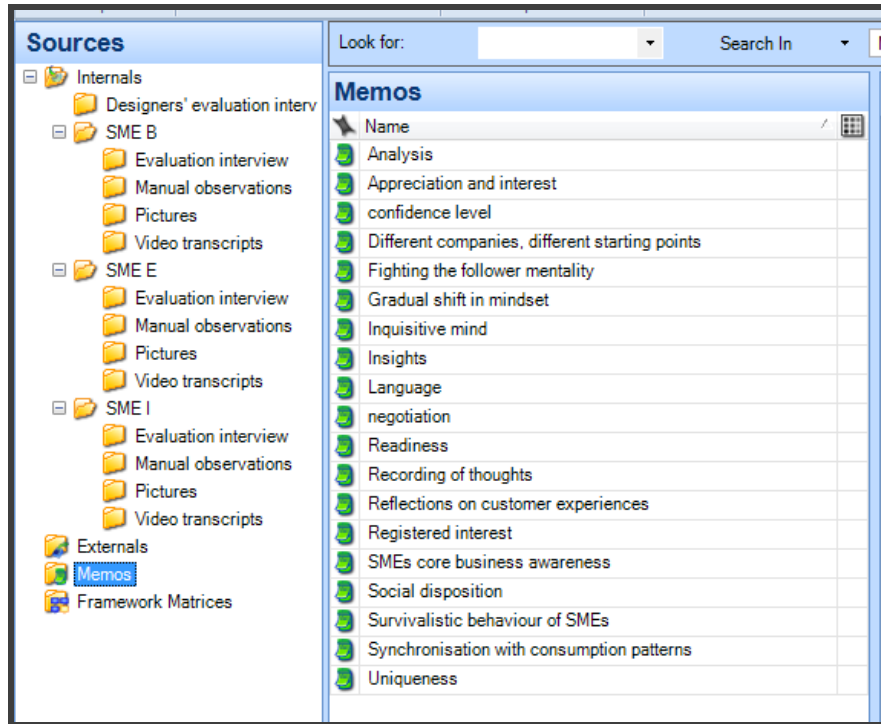
Figure 4-11: Data sources and memos

Figure 4-12: N-Vivo nodes for analysis of workshops

4.7.4.5   Attributing chunks of data

Confidentiality of participants was one of the ethics this research project had to conform to. In order to adhere to it, participants' names have been given alpha numerical codes in this thesis. Through these codes, chunks of data have been attributed to identify participants and the data source (transcripts). DES I-SME B: ACT II would refer to a citation for one of the designers identified as designer I, during activity 2 of a bag manufacturing SME identified as SME B. These have been consistently used throughout the thesis to refer to the same person or company.

4.8   Research quality

Issues of research quality are concerned with data that can be said to be representing the truth objectively. This is addressed by validity, generalizability and reliability. In qualitative research designs, these are usually looked at differently from quantitative research designs (Robson, 2011).

4.8.1   Validity

Validity is the extent to which the process of observing a phenomenon is geared towards what is said to be observed (Mason, 2002; Robson, 2011). Validity is concerned with synergy from research questions to sampling, data collection and analysis and ethical issues (Flick, 2006). The findings from this rigorous process lead to increased confidence in validity. This is particularly true when more than one method of data collection has been used to cater for shortcomings of one method (Robson, 2011). If there are similar patterns in findings from different methods, then at least three basic forms of error that can occur will be minimised. According to Flick (2009) these forms of error are: rejecting what is correct; seeing a relation or principle which is not correct; and asking the wrong questions. In order to address validity concerns in this research project, some precautionary measures were observed.

In light of synergy in research design, decisions for each study were guided by research objectives and questions. The rationale for decisions over the type of study, data collection and analysis techniques was provided. Activities in each study through

throughout the research process were recorded to provide a complete account of what happened and how it was done until findings were arrived at. In light of what Robson (2011) suggests in terms of using more than one method of data collection, the case study approach addressed related shortcomings. Multiple methods were used from literature review; Delphi technique; interviews; observations; and workshops. These different methods were also used to collect data from various sources like experts (Delphi technique); interviews, observations and workshops (SME owners/managers and designers). This enhanced method triangulation and increased rigour of the research (Robson, 2011; Creswell, 2013).

Some methods used like the Delphi technique had increased internal validity due to its iterative approach, allowing participants to review their responses between rounds as they compare their responses with those from others in the panel (Okoli and Pawlowski, 2004). In the case of interviews, each subsequent interview as informed by observations from a previous one (the reason why a semi-structured type was preferred). Between studies, the outcome of the previous study was tested in the next as was the case in phase three to phase four. During data analysis, a rigorous iterative process was also adopted, constantly comparing and reviewing the coding process to ensure consistency. Regular reviews of this research project were also undertaken involving supervisors, peers at both internal annual university research conferences and externally at four international conferences. This regular review process often identified and helped address validity and reliability issues.

4.8.2   Generalizability

Generalizability is concerned with *'the extent to which you can make some form of wider claims on the basis of your research and analysis'* (Mason, 2002). This research aims at generating new insights in the context of PSS adoption by non-design led SMEs. Generalisation therefore depends on quality of sampling decisions in terms of how the cases have been looked at rather than how many cases as is the case in quantitative research (Flick, 2006). Generalisations made from purposive sampling strategy used in

this research project were not sample size related since qualitative samples are usually small in size (Ritchie and Lewis, 2003).

Wider claims from findings of this case study research project can be addressed through analytic generalisation (Gomm et al, 2000; Yin, 2004; 2009), where patterns of data from studies conducted at different phases of the project provide the basis for generalisation (Robson, 2011) as opposed to generalisation based on statistical data and relationships therein concerning the sample size and the study population (Ritchie and Lewis, 2003). Although the research was done in the context of Botswana, descriptions of findings expanded to a wider context. The purpose of these expansive descriptions was to provide a basis on how contextualisation of PSS adoption in SMEs led by design can be applied and possibly replicated in various situations of SMEs in similar situations. The outcomes of this research project position this purpose in a whole systems design support context with no specific reference to Botswana.

4.8.3   Reliability

Mason (2002) views reliability as the extent to which research methods and techniques accurately produce data. Silverman (2006) advices that detailed research strategy and data analysis methods in a qualitative research make the research transparent, increasing reliability of research findings. The use of low-inference descriptors therefore increases reliability of qualitative research. This involves capturing qualitative data "in terms that are as concrete as possible, including verbatim accounts of what people say, for example, rather than researchers' reconstructions of the general sense of what a person said, which would allow researchers' personal perspectives to influence reporting" (Seale, 1999, cited in Silverman, 2006).

Transparency in this research project was promoted through developing detailed protocols for each study to guide data collection and analysis. Protocols provided details of how the studies evolved and as well as how data collection and analysis unfolded. In case of the Delphi study protocol, the structured communication typical of a Delphi study marked by feedback provided at the end of each round, such that

participants have room to revise their position looking at the group views, makes test-retest reliability a non-issue for a Delphi study (Okoli and Pawlowski, 2004). In terms of reporting the findings, each theme was supported by verbatim accounts of what participants had said. These steps ensured accurate production, processing and presentation of data.

4.8.4 Response rate issues

Issues of low response rate in self-completing questionnaires are highly acknowledged as common serious problems (Robson, 2011) and so frequent follow-ups were attempted to encourage participants to complete the questionnaires in case of the Delphi study. During the main study, response bias for participants who may not be able to eloquently read and write was taken care of. Response bias may contribute to low response rate as people with lower abilities of reading and writing may not respond or give someone to fill in self-administering questionnaires for them resulting in misrepresentation of views from intended participants. To cater for this, interviews were used since they do not require such skills (Robson, 2011) as the interviewer is in control of the situation and can allow flexibility to accommodate literacy differences among participants. In order to address the literacy concern further, all interviews and workshops with SMEs were conducted in the local language to minimise chances of misinterpretation of questions and misunderstanding discussions.

4.8.5 Ethics

An observation of qualitative research ethics was vital since this research involved human participants. Protecting them and their interests throughout the research process was the researcher's obligation (Flick, 2006). Ethical clearance was obtained from the Loughborough University Ethical Advisory Committee to ensure conformity of the research. This involved a process of completing ethical clearance proposal including a checklist for studies involving human participants. Although the Delphi study was an online procedure, invitation letters were sent to experts requesting them to participate (see Appendix F). Acceptance to participate was followed by a detailed protocol further informing participants in detail about the purpose of the study (see

Appendices A and B). For interviews and workshops, a participant information sheet (see Appendix G) was sent to participants prior to the studies including their right to withdraw from the study anytime they wanted to. At the beginning of each study, participants were informed of the study procedures and permission to record was also sought. This was followed by signing of informed consent forms (see form in Appendix H). In addition to assuring participants confidentiality of their information, data was stored securely, accessible only by researchers and in conformity to the Data Protection Act of 1998 as recommended by the University Ethical advisory committee.

5 Scoping study

This chapter presents the main findings of a Delphi study conducted with a homogenous panel of 9 experts as a scoping study. The context justifying the need for the Delphi study is described together with objectives and research question guiding the study. The direction for further research in this project is defined from insights gained from the findings. In order to provide an overall breadth of the evidence, the study briefly introduces the case of manufacturing SMEs in Botswana then details the results of the Delphi Study.

5.1   The manufacturing landscape and the market in Botswana

Geographically, Botswana is a landlocked country located east of Namibia and North of South Africa. The country's economy is heavily tied to South Africa's economy and depends mostly on South Africa for most supplies. The manufacturing sector is unduly affected by this. Many of the supermarkets operating in Botswana are from South Africa. Their products are imported from South Africa and this makes it difficult for local manufacturers to penetrate the local market. These businesses tend to seek their merchandise from home (South Africa) which offers support to their local manufacturing industry as well.

Botswana's slow growth of her manufacturing sector has been attributed to its small market base. The population of Botswana is just over 2 million. Though the population growth rate is relatively slow, consumer spending (indicated in millions of Botswana Pula in the Figure 5-1) has increased over the past few years with a rapid increase in 2011. This increased spending is an indication that there are more goods and services being sold in the local market. Interestingly, the diversity of imported products in the market and mind-set of locals in favour of foreign products speak volumes in terms of the market's potential to support the local industry.
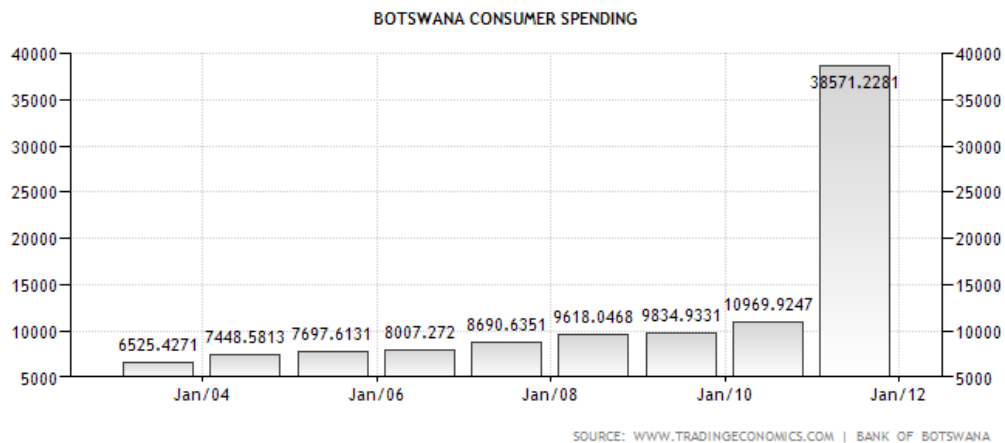
Figure 5-1: Botswana consumer spending

5.1.1 Competitiveness

Use of the term competitiveness seems to be anathema in Botswana. Available literature on the term in the country report SMEs lacking competitiveness and broadly suggest competitiveness indicators for SMEs as innovation, use of resources and general business management skills (Metcalf et al., 2003; Government of Botswana, 1999; Government of Botswana, 1996; Sentsho et al, 2007; Africa Development Bank, 2009; Nkwe, 2012). Yet, paradoxically support for SMEs from government inaugurated custodians seems to be only geared towards business management and administration with little attention to innovation and resource usage issues. Stiff competitors from China and imports from South Africa still fight for the small market with the local companies. The visible copy tendency of local entrepreneurs makes the situation even worse. These businesses are generally a duplication of the other with almost the same value offerings. Another paradox comes from the manufacturing SMEs managers themselves who seem to rate competition information as important and spend a lot of time searching for it (Jorosi, 2009) but still continue copying especially interventions from western countries (Letsholo et al., 2009).

Innovation and economic success are inseparable. The world competitiveness report shows that the most successful economies (developed nations) operate as innovation economies. Looking at its stature in economic success, it is reason enough to identify innovation as one of the key competitiveness indicators for

Botswana. Innovation and competitiveness from the policy continuum looks well-articulated and prioritised by government. Perhaps the absence of legislation to compel companies to comply and increased access to finance are the missing link. However, innovation and competitiveness from the market perspective is potentially more beneficial. It is very likely that companies will see the business benefit of rapidly taking up innovation as sales increase.

5.2   The Delphi Study

The Delphi study was the first of the three stages of data collection in this research project. The aim was to get expert opinion on what they think was important for SMEs in Botswana to adopt sustainable Product Service Systems as a way of addressing their competitiveness concerns. The study went on from May 2012 to August 2012 over two iterations. For detailed description of the study and how the study was conducted see section 4.7.2. This chapter reports findings aimed at addressing the following objective and research question:

Objective: To identify factors relevant for manufacturing SMEs in Botswana to explore sustainable PSS as a competitive business strategy

Research question: What are the important factors to be considered for SMEs in Botswana to adopt sustainable PSS as their competitive business strategy?

5.3   Findings

The overall impression from qualitative feedback on the quality of this Delphi is that it was a very important study to provide useful input in developing support for SMEs. A sample of these responses is given below:

"Experience *on the ground has shown that Government/Parastatals intervention with SMEs lacks the knowledge of the above and as such provides poor or 'wrong direction/advice and guidance".* Expert D – Round Two

"*This is an important study. Hope that the findings will inform progressive policy to implement PSS and re-invigorate the SME sector in Botswana and beyond".* Expert C – Round Two

Findings of this investigation are presented per each round.

5.3.1 Round One:

Round One findings are tabulated in Tables 5-1, 5-2 and 5-3. While these were generated by experts looking at the situation in Botswana, most of the themes suffice in related literature of PSS methodological support (Morelli, 2006), PSS competitive edge (Tukker and Tischner, 2006) and barriers to PSS adoption (Tukker, 2004; Besch, 2004; Bianchi, 2009). Emphasis by Morelli (2006) on the importance of defining direct and indirect relationships between actors, their interactions and involvement in the system is echoed by multidisciplinary SMEs' theme in Table 5-1 and innovation support programmes, collective intelligence and co-creation of value, government support, PSS policy framework, PSS education and communication themes in Table 5-2. The central idea in these themes is promotion of collaborations and stakeholder involvement in value co-creation for SMEs. The multi-disciplinarity of value co-creation in PSS requires that stakeholders be identified and their roles defined, including communication and interaction channels.

The argument put forward by Tukker and Tischner (2006) on the competiveness of a PSS supports its value in small firms in a developing context. The authorities argue that PSS can be competitive in industries where superior tangible and intangible value can be delivered by more customised solutions. This is reflected in the innovative and sophisticated SMEs and the market themes in Table 5-1. In these themes emphasis is on looking for unique selling points in the market by identifying PSS opportunities and offering PSS value as a technical sophistication to gain advantage.

The experts highlight similar barriers to PSS adoption articulate in section 3.3.6 and summarised in Table 3-5. Common barriers like lack of finance and legislation have also sufficed in this Delphi study as shown in Table 5-3. Peculiar to the context of Botswana is socio-cultural value of *botho* (humility) in business. The position of experts concerning this value is the risk it poses to small businesses as they often run at a loss as a result of being nice. Other critical barriers in Table 5-3 pertain to

mind-set issues as shown by the stereotype theme, political interference in business development and reflections on the failed non-contextualised approaches. These barriers are critical to overcome to facilitate a conducive environment for PSS competitiveness in environments where smaller income families exist as argued by Tukker and Tischner (2006). The experts identify the issue of low-income society in Botswana as a barrier to PSS adoption under the socio-economic issues theme. However, lower system costs resulting from sharing and leasing concepts of a PSS can increase access to products through intensified use of products (Tukker and Tischner, 2006).

Table 5-1: Visions of PSS competitive advantage for manufacturing SMEs in Botswana

Themes	*Codes*
Innovative and sophisticated SMEs	Originality not '*copy cats*'; Unique propositions; Have Unique Selling Point (USP); Stylised and fashionable offerings (wants); Improved product quality; New and emerging trends – PSS
Sustainability and economic diversification	Environmental issues; impacts of transportation of raw materials, material selection, manufacturing technologies; Social issues; adaptable and expandable practices that can suit the context; Economic; increase generation of income – *businesses want to make money*; Sustainability in Products/services
Multidisciplinary SMEs	Collaborations and links between stakeholders; Partnerships; Product development teams (designers, manufacturers, marketing personnel etc); Innovation-led organisations
SMEs with PSS knowledge	PSS awareness and appreciation; Knowledge-based competencies; Practical-based competencies; PSS design and market consideration
Locally available resources	Locally available materials e.g., leather (hides and skins); Skills (craftsmanship); Competent and experienced partners; Indigenous knowledge; Indigenous products; Indigenous technologies
The market	Technical sophistication (PSS) instead of the traditional product selling model; Increased resilience; Knowledge of market requirements; Marketing skills; Opportunity identification; Flexible competition
SMEs as entrepreneurs	Self-driven; Knowledgeable; Committed individuals; Business intimacy; Positive mind-set

Table 5-2: Strategies for achieving visions

Themes	*Codes*
Innovation support programmes	Collaborative innovation systems (with aligned HEIs research strategies); Inspirational PSS data base of best practice exemplars; SMEs growth and development; Assistance from established businesses; Contextualised PSS offerings; Value addition to existing product offerings
PSS mentorship programmes	Structured and progressive; Targeted and driving high growth SMEs
Collective intelligence and co-creation of value	Partnerships; Collaborations; Internal value co-creation; External value co-creation
Knowledge transfer	Contemporary technologies; Practically-based competencies; Knowledge-based competencies; Adoption of industry culture; knowledgeable employees
Government support	Embrace PSS; Bilateral agreements; Knowledge and skills exchange with knowledgeable, skilled and experienced international partners; Rebates and incentives
Resource utilisation	Locally available potentials to reduce costs; Available and appropriate technologies; Value added features to existing products
Strategic choices	Proper planning; Competency specialisation; Division of labour; Outsourcing; Part of a large value chain; KPIs; Product/service differentiation; Specialised offerings e.g., leather shoes, bags, belts
PSS policy framework	Adequate and protective; Supportive and coordinative; Strategic and well controlling; Promote adoption of PSS; Encourage international collaborations and ease of doing business; Responsive to manufacturer's concerns
SMEs Cooperatives and Clusters	Mutual economic benefit
PSS Education	For SMEs; For stakeholders; PSS benefits; Global competitiveness
Communication	User-manufacturer interactions; Manufacturer-stakeholder interactions; PSS value and importance
Mind-set change	Attitudes of customers; Attitudes of SMEs; Reduce dependency on government initiatives

Table 5-3: Barriers for PSS adoption

Themes	*Codes*
Stereotypes	Economic; the current status quo is the only viable way of making money; Resistance to change; Fear of failure; Ignorance of potential benefits of PSS; Follower mentality 'it can only be done once it has been successful elsewhere'
Social-cultural values *sub themes;*	Botho (not a good business value as small businesses tend to run in loss as a result of being nice);
Socio-economic issues *sub*	Low income society; Less money circulation; Social life strains
Business leadership	Knowledge driven instead of politically driven
Financial	High interest loans from financiers/lack of interest free loan schemes; R&D; Funding for PSS ideas; Cost of currently imported raw materials; High taxation rates
Legislation	Obligations from existing trade agreements; Unprotected local companies (*from cheap and poor quality imports*); Conflicts between existing agreements and developmental plans
Passive business culture	Lack of outsourcing; Less informative process and material selection
Inconsistency of support from Parastatals	
Non-contextualised approaches	
Poor company reputation	

Categories were translated into sections and themes together with their sub-themes as items in Round Two. Under each section there was a comment box for participants to give qualitative feedback looking at collective group position.

5.3.2 Round Two

Categories and themes in Round One became central to the direction of the Delphi in Round Two. As mentioned in section 4.7.2.3, Round Two questionnaire was composed of Likert scale items. Experts ranked these in terms of their importance.

A list of prioritised goals that emerged from round two based on cumulative percentages of participants who rated goals as important and very important, is given in Figure 5-2.
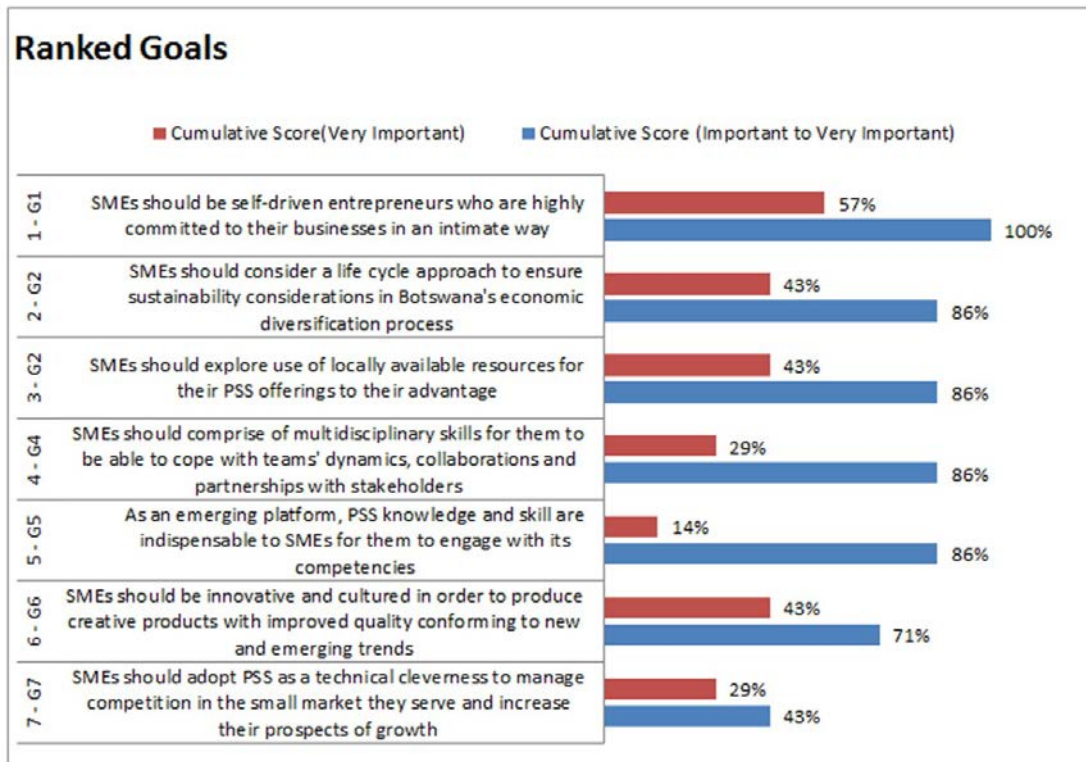
Figure 5-2: Ranked goals

Many goals were rated as equally important. The panel generally agreed of the importance of the first five goals (i.e. >86%). Consensus for goal 7-G7 was very low with a disagreement percentage of 57%. This interestingly conflicted with previous related literature (UNEP, 2002) which contended PSS suitability in developing countries and small markets. Another observation in the findings is that though the experts did not agree on PSS adoption to manage competition in small markets, they agreed on goals related to PSS and locally available resources (3-G2) and the importance of PSS knowledge and skills for SMEs (5-G5). The dispersion of PSS related goals in the rankings is very surprising given that the experts did not explicitly agree on its adoption but may indicate an implicit agreement to the same.

Goals not directly related to PSS that experts put emphasis on included SMEs as committed entrepreneurs (1-G1), life cycle thinking (2-G2), skills and collaborations

(4-G4) and innovation (6-G6). Though these do not explicitly mention PSS they are all necessary requirements for any system to be successful. A similar trend was observed with prioritisation of strategies.

The list of prioritised strategies in Figure 5-3 show high consensus for almost all strategies. All the experts agreed on 1-S1 showing their emphasis of proper planning and product/service differentiation. 86% of the experts rated ten of these strategies as important (2-S2 to 11-S11). An interesting observation is how experts rate innovation support programmes (2-S2) on equal footing with PSS related strategies (3-S2 to 5-S2). Although 86% of the experts rated collaborative innovation support programmes to the second spot, only 71% rated partnerships and collaborations promotion to the last spot (12-S12). This is a surprising contradiction in ranking of strategies related to collaborations.

Ranked Strategies

■ Cumulative Score(Very Important)   ■ Cumulative Score (Important to Very Important)

	Strategy	Very Important	Important to Very Important
1 - S1	Encourage strategies to facilitate proper planning with clear KPIs, competency and offerings' specialisations, identification of outsourcing niches and product/service differentiation	43%	100%
2 - S2	Develop innovation support programmes enabling effective collaborative systems between stakeholders and comprising of insiprational databse of best practice exemplars	71%	86%
3 - S2	Foster mindset change for SMEs to embrace PSS as well as reduce dependency on government	71%	86%
4 - S2	Clarify essential communication networks and systems defining interactions between stakeholders	71%	86%
5 - S2	Provide PSS education aligned to needs of SMEs and stakeholders pointing to clear PSS benefits and value	71%	86%
6 - S6	Empower SMEs with knowledge and practical based competencies to enhance their decision making in a competitive industry culture	57%	86%
7 - S6	Encourage government support through PSS promotional rebates and incentives and partnerships with skilled and experienced international personnel	57%	86%
8 - S6	Encourage SMEs to form cooperatives and clusters for mutual economic benefit	57%	86%
9 - S9	Develop PSS mentorship programmes with a clear structure, targeted at priority sectors addressing sector specific issues and driving high growth SMEs	43%	86%
10 - S9	Provide clear PSS policy framework adequaltely supportive and coordinating promotion of PSS among SMEs	43%	86%
11 - S11	Promote use of locally available resources as a potential cost reduction and differentiation strategy	29%	86%
12 - S12	Promote partnerships and collaborations as an engaging way for SMEs to adapt to value co-creation dynamics	43%	71%

Figure 5-3: Ranked strategies

Consensus was generally very high in Round Two and this warranted stopping the process. However, further analysis was needful to explore major areas under which these priorities belong. The purpose of taking the analysis to the next step was to integrate these priorities into broad thematic areas that can be investigated further in the next phases of the research with SMEs themselves. This analysis and synthesis process resulted in four thematic areas (Figure 5-4) which have been discussed below. Three of the themes directly related with the systems thinking theme following the arguments advanced by experts that SMEs needed to operate in a systemic context. Understanding context was found to be directly related to systemic dynamics in terms of socio-economic issues and complex challenges that come with supporting SMEs through economic diversification agenda. The value of

119

design thinking also had systemic bearings in that the context of meeting user needs was now being redefined in a transformed way of developing products and services. Thinking of a new way of meeting user needs through non-product ownership offerings as demonstrated by the position of experts on the need to instil the ability to innovate through collaborations. Sustainability practices were interpreted in the context of PSS being an innovation strategy responding to triple bottom line pillars. This relationship between these themes therefore made systems thinking a central theme from this Delphi study, placing PSS as a potential strategy to explore its value in a manufacturing context.
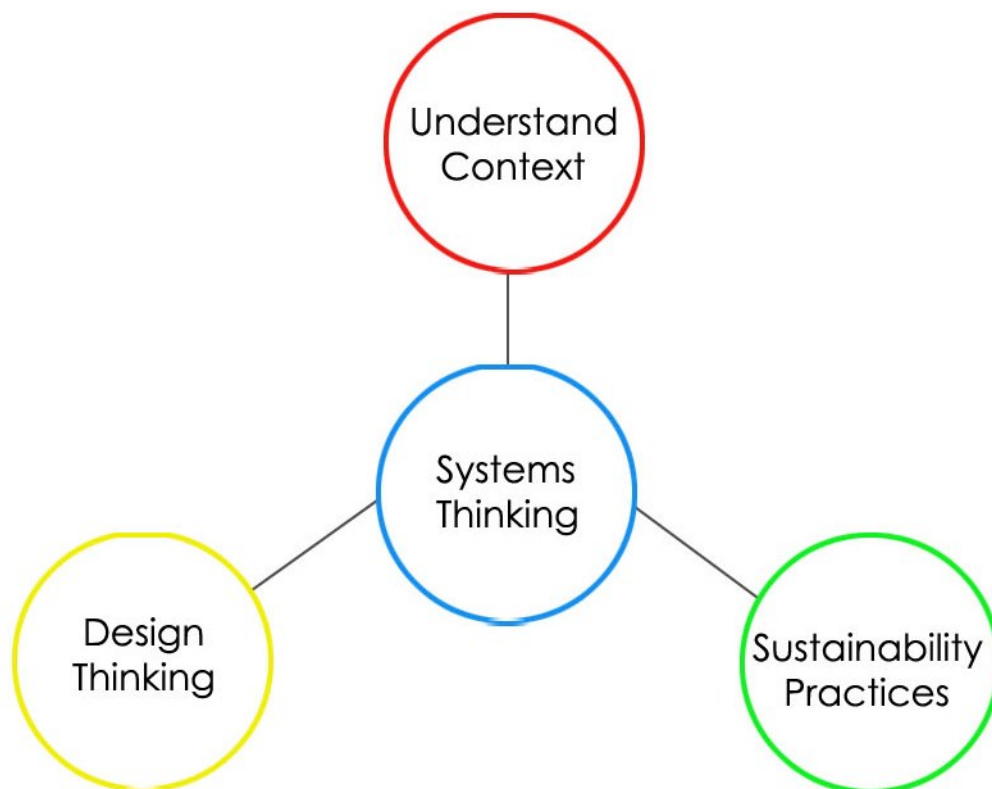
Figure 5-4: Major themes from the Delphi study

5.3.2.1 Understand Context

The experts emphasised the importance of socio-economic context in which SMEs operate for any intervention to be meaningful. This is especially so as the country has now realised the need to diversify its economy to support SMEs in the manufacturing sector as one among priorities. To minimise chances of rejection it is important to demonstrate PSS benefits for Botswana, especially if PSS is to promote

growth of specific SME industries identified in the country's economic diversification drive policy as one expert notes;

> *"PSS should embody the potential for sustainable innovative ideas for Botswana SMEs because sustainability with existing and emerging dynamics of economic and cultural change. For Botswana SMEs, PSS should represent a potential economic transition towards the service economic diversification as enshrined in Botswana's vision 2016. The whole concept being to present a promising path to industrial development".* Expert G – Round Two

Enabling mechanisms within the context like government support for new interventions towards economic diversification should be a backbone for PSS adoption by manufacturing SMEs. The experts declare their position to this extent through strategy 7-S7, 'Encourage government support through PSS promotional rebates and incentives and partnerships with skilled international personnel'. An influence of globalisation on consumer decision-making should also find local manufacturers ready to operate in the same context for them to remain in business;

> *'Batswana are now rethinking the definition of consumer desire and protection as it relates to standard of living; hence they are moving away from the traditional concept of product ownership as a primary goal'.* Expert B - Round Two

Perhaps the biggest contextual barrier to overcome should be the observed passiveness of SMEs characterised by lack of self-drive and commitment to their businesses. 100% of the experts agree on this issue as echoed in goal 1-G1, 'SMEs should be self-driven entrepreneurs who are highly committed to their businesses in an intimate way'.

5.3.2.2 Systems Thinking

Since contextual dynamics seem to be impacting on SMEs businesses in a complex way, systems thinking becomes inevitable. Economic diversification is a complex challenge and supporting manufacturing is very likely to increase environmental problems from manufacturing activities, number and variety of actors in their value

chain and advanced requirements of knowledge and skills. Moreover, competitiveness of these SMEs operating in a traditional product-oriented model (Tan et al., 2006) becomes even more difficult and obsolete. This requires a whole system approach that encourages collaborations between these actors and optimised solutions responsive to environmental, social and economic sustainability concerns (Charnley et al., 2010). In this case, the position of manufacturing SMEs in today's service and knowledge oriented global society should be defined;

> *'SMEs in Botswana should strive to articulate a system of stakeholder relationships within a service context….. The whole being to present SMEs in Botswana with opportunities to produce eco-efficient PSS. This will create a conducive environment: (1) The dematerialisation potential of new innovations shifting the production of value from hardware to software. (2)The increased possibilities of managing more and more complex systems of interactions allowing more eco-efficient flows of resources and information on a systemic level. (3) The increase of outsourced activities leading to better possibilities of increased resource consumption'.* Expert G – Round Two

This implies that manufacturing SMEs do not necessarily have to do everything in their value creation process especially when such activities can be more economic when performed by a third party in the system yet with less environmental impacts. 86% of the experts agreed to a systemic approach (see goal 2-G2 in Figure 5-2). A systemic approach that comes out more prominently from the experts is a PSS business strategy. The experts articulate the need to show the environmental and economic value of sustainable PSS to SMEs *"in order to market the innovation to stakeholders both inside and outside the company, or to the company's strategic partners"* (Expert A). In this way a mind-set change will effect and *win in* potential partners and collaborators into a PSS landscape;

> *"It is critical to demonstrate clearly to the SME sector that a paradigm change (of its collective worldview) is required so as to sustain themselves in a PSS landscape. An 'add-on' mentality would defeat strategic efforts to implement change".* Expert D – Round Two

Mind-set change to PSS is among top priority issues as it was favoured by 86% of experts (see strategy 3-S2 in Figure 5-3). An empowering atmosphere towards mind-set change should emanate from availing PSS knowledge and skills to SMEs as well as possible collaboration networks and benefits (see goals 4-G4, 5-G5 in Figure 5-2; strategies 4-S2, 5-S2, 6-S6, 8-S6 in Figure 5-3). A vital dimension in this process is the capability of sustainable PSS to support SMEs competitiveness amidst of their resource constrained situation. These SMEs seem to be spending a lot of time seeking information on competitiveness (Jorosi, 2006) yet little appears to be done in addressing it.

5.3.2.3 Sustainability Practices

PSS can be largely beneficial to SMEs if sustainability is the core agenda. Sustainability practices promote use of locally available resources that SMEs can take advantage of, such as indigenous institutions of knowledge. Use of locally available resources can promote successful contextualisation of interventions to address the limitation of superimposing interventions from other contexts. Seeking to use locally available resources, promoting efficient resource consumption and voluntary product take back to aid material recovery can be an effective cost-saving strategy. This is especially important in the case of expensively imported raw materials. Sustainability in a systemic context (see 5.3.2.2) can lead to competitiveness of SMEs as provision of new services to enhance the 'product-service mix' offering opens new value spaces to be occupied. In this way PSS becomes a sustainability innovation strategy responding to environmental, economic and social concerns caused by SMEs' business activities (Klewitz and Hansen, 2011). Sustainability occupied important priority spots in goals prioritised by experts (see goals 2-G2 and 3-G2 in Figure 5-2) in terms of life cycle approaches and use of locally available resources. This extends the responsibility of SME manufacturers beyond point of sale and urges them to come up with innovative services attached to their product offerings. This can also be a positive contribution in controlling how customers use the products, reducing their abuse and facilitating ease of material recovery.

5.3.2.4 Design Thinking

An important commentary from experts was in its entirety, design thinking. "Thinking like a designer can transform the way you develop products, services, processes – and even strategy" (Brown, 2008). The experts' call for design thinking was latent in their position on having a new way of doing things through supporting innovation activities in an environment of collaborations and partnerships employing user centred approaches. This is design thinking according to Danne and Martin, 2006. Though design thinking is not originally a design concept, there is no doubt that for manufacturing SMEs this would be beneficial not only to enable them cope with a systemic environment but also promote design which is a direct input of manufacturing.

Through design thinking SMEs can make creative and sustainable decisions about their product and service components of their PSS offerings. It will be essentially powerful especially to give SMEs a competitive edge as they take advantage of input from collaborations to differentiate their offerings in meeting users' needs as they make then want their PSS offerings;

> *"I once spent some time with a very well-known UK Marketing Guru. He advocated the massive advantage of turning a need for a product into a WANT. We all need shoes but very few of us buy with the utility need in mind. If that was the case Jimmy Choo would be unknown".* Expert C – Round Two

Design thinking should address innovation deficiencies in an integrated way especially through involving users as these are the market for SMEs' PSS offerings;

> *"SMEs need to address the market as this will be a new concept to users especially moving from owning to leasing products and services. If they can penetrate this barrier then the concept will be viable".* Expert A – Round Two

Innovation activities organised in this way should also empower SMEs with the ability to differentiate their offerings and foster originality in SMEs to get them out of copying or their norm of a follower mentality;

124

'Innovation support framework should be given priority as we don't have that culture of radical or incremental innovation but rather copy-cat innovation'. Expert C – Round Two

The experts strongly declared their position on this issue in strategies 1-S1 and 2-S2 (see Figure 5-3). This should enable SMEs to build a positive company image, which in turn should enhance competitive advantage of their sustainable PSS offerings as people realise the impact of a company's offering in meeting their needs.

5.4 Conclusions

In conclusion, this Delphi study extends the debate of suitability of Product Service Systems and its benefits especially competitiveness for manufacturing companies, especially SMEs, in developing countries. It is believed that this Delphi is the first of its kind especially seeking to address these issues in the context of Botswana. The experts' contributions have provided a holistic picture of what a competitive PSS strategy could comprise of in the context of small companies operating in Botswana. The Delphi study has portrayed a picture of experts' opinion about SMEs' competitiveness in a PSS setting.

Contextual relevance of PSS will need to be established through further research involving a specific SME industry among those highly prioritised in Botswana. More importantly, in line with the country's economic diversification agenda, manufacturing SMEs in the Leather and textile industries are among top priorities (Government of Botswana, 2010). Pursuing PSS's contribution to competitiveness in a specific SME industry will help address industry specific value creation dynamics including the level of innovation or lack of it that may be an advantage or disadvantage for PSS in such industries.

Although the prioritised goals and strategies reflect their order of importance according to experts, it is clear that issues raised by experts are highly interrelated. Addressing them in isolation may be catastrophic as encouraging collaborative innovation approaches alone may not guarantee uptake of environmental

sustainability issues. Yet according to the findings competitiveness of these SMEs relies on the inter-play between the four broad themes of understand context; systems thinking; design thinking; sustainability practices. Although this research does not ambitiously aim to address all priorities, a strategy anchoring on these four themes may ignite a competitive SME environment in Botswana.

The original intention of identifying priority factors for SMEs adopting PSS as their competitive business strategy was met. The Delphi study has provided answers to research question 2: What are the important factors to be considered for SMEs in Botswana to adopt PSS as their competitive business strategy? However there is need for further investigations involving a specific SMEs industry. For reasons in these conclusions vindicating government priorities in their economic diversification agenda, SMEs in the leather industry will be used for further research.

The four themes of understand context; design thinking; systems thinking; sustainability practices, arrived at in Round Two of this Delphi exercise capture experts priorities comprehensively. These themes capture the whole landscape of PSS and how it can bring competitiveness in manufacturing SMEs of a developing Botswana, especially where a culture of innovation has been observed to be missing by the experts. Among the four themes, sustainability should be core driver of this PSS innovation strategy. The cost savings from initiatives like for example reusing and recycling together with decisions made during the design stage of whether user needs could be met with or without a physical product ownership may drive environmental and financial benefits.

Moreover, design thinking through its user centred approaches positions this innovation strategy to be a market driven one as opposed to a policy driven strategy. This may further demonstrate superiority of use of knowledge in collaborations and partnerships in driving competitiveness over government regulations, presenting a new way of doing business for SMEs as contested by this Delphi.

6 Experiences and perceptions of SMEs in the leather industry

This chapter presents a case study conducted with 18 leather manufacturing SMEs in Botswana. A description of the context is provided. The main findings are discussed, leading to drawing implications of SMEs' competitiveness experiences and perceptions of sustainability and PSS for practice. These are translated into a systems success framework to allow further testing of these implications for practice.

6.1 Introduction – Economic diversification and the leather industry

With impacts of the recent economic crisis on her economy, Botswana has since sought to explore other avenues for economic growth and diversification (Government of Botswana, 2013). The heavily diamond dependent economy was hard hit by reduction in diamond revenue further putting to a test the popular diamond mining slogan in the country: *diamonds are forever*. The importance of the leather industry for economic diversification is highly rated in many government policies (Government of Botswana, 2010; 2011). Since the government depends on diamond revenue to fund most of its projects, the ultimate intention behind economic diversification is to have a private sector independent from government support.

The growth and development of the leather industry is targeted to achieve two things (Government of Botswana, 2010; BEDIA, 2006; 2008):

1. reduce the import of leather products by supporting and growing the local industry
2. exploit the export potential of leather products from Botswana

In this chapter, the focus is on exploring the first target: reduce the import of leather products by supporting and growing the local industry. This directly

concerns exploring and understanding factors impacting the local leather industry from prospering. The following sections discuss dynamics of the leather value chain in Botswana.

6.1.1 Local sources of raw materials

Botswana's livestock population demonstrates abundant availability of raw materials. Koloba and Moreki (2010) give an indication of livestock population in Botswana to demonstrate this availability (Table 6-1). The unprocessed leather is mainly exported to South Africa, Namibia and China (Molaodi, 2007).

Table 6-1: Livestock population, adapted from Koloba and Moreki (2010)

Species	Number of Livestock
Cattle	2 353 186
Sheep	161 100
Goats	576 663
Donkeys	126 937
Horses	31 698
Pigs	9 878

Botswana produces and exports approximately 300 000 cattle hides, 20 000 small stock skins mainly sheep and goats and 2500 ostrich skins (BEDIA, 2006). The quality of the leather is arguably not good for industries like the automotive industry, which demands first grade leather. Developments in cattle farming approaches can improve leather quality (Koloba and Moreki, 2010). Due to issues concerning the quality of the hides, not all of them reach the market. Processed hides and skins are then used in furniture, car seats, bags and horse straps among others.

6.1.2 Businesses in the leather industry

The leather industry in Botswana according to BEDIA (2008) mainly comprises of tannery, upholstery and garments. These are briefly described in Table 6-2. However the value chain comprises of slaughter facilities (for animals), hide collectors, hide exporters, tanners and leather manufacturers (Tshukudu, 2012).

Table 6-2: Businesses in the leather industry

Leather sector	Description
Tannery	Processing hides and skins and production of different types of leather needed for manufacturing leather products
Upholstery	For use in the furniture industry and related products as well as in the automotive industry
Garments	Use in garments including shoes, bags, wallets, belts and other leather accessories

6.1.2.1 Tannery

There are very few businesses in leather tanning in Botswana. There is one wet blue[1] tannery (for semi-processing hides and skins to get them ready for industrial processing into leather sheets), one industrial leather processing plant and several other artisan tanners of which only four are actively involved (Paya, 2006). Artisan tanners do small scale/vegetable tanning which does not produce leather of high quality and quantity (Koloba and Moreki, 2010). The primitive technology used in the process also leads to negative environmental impacts due to poor effluent handling approaches. The only industrial leather processing plant established in 2006 (BEDIA, 2006) has since shut down (Piet, 2011). Following information from Koloba and Moreki (2010), BEDIA (2006; 2008) and Tannery Industries Botswana (2009) the leather value chain is shown in the Figures 6-1 to 6-3.
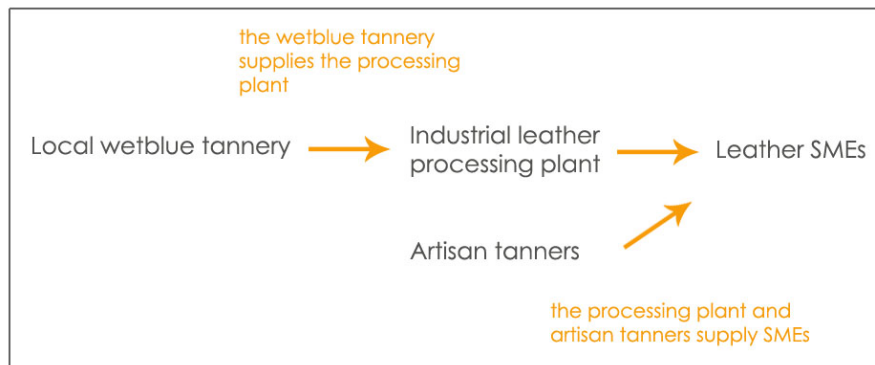
Figure 6-1: Local leather value chain

In full operation, leather processing plant produced 1000 leather sheets from cattle hides and 400 from small stock and game per day (BEDIA, 2008). After the closure

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[1] Wet blue leather is a hide that has been tanned using chrominus sulphate. It is an intermediate stage between untanned and finished leather

of the local wet blue tannery there was no supply to the industrial leather processing plant locally resulting in them importing wet blue leather from South Africa (Figure 6-2) (Mmegi, 2012).
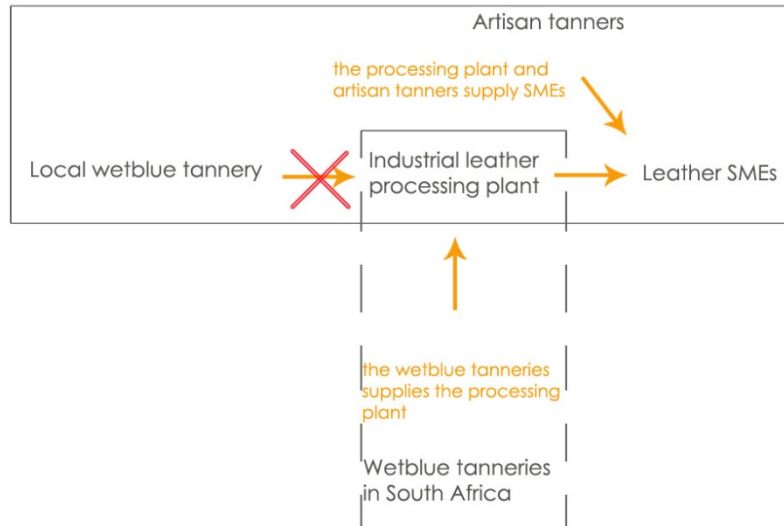
Figure 6-2: Imported wetblue leather value chain

Lack of government support to cushion the high running costs of low and unreliable supply of imported wet blue leather led to the collapse of the industrial leather processing plant (Echo, 2013). Major activities at the plant were drying, conditioning, upgrading and finally spraying. Leather processed in the facility was used for shoe uppers of different kinds of shoes and linings; upholstery (furniture and car seats); garments and leather goods including bags, wallets, jackets and belts (Tannery Industries Botswana, 2009).

The local supply chain was now crippled and this lead to opportunistic behaviours of off-spring local third party suppliers and suppliers from South Africa (Figure 6-3). Third party suppliers bought leather in South Africa to sell in the local market. This resulted in local businesses getting the resource more expensively, consequently affecting their overall manufacturing costs and the ultimate price of the final product. Leather SMEs also had to buy directly from suppliers in South Africa. Getting raw materials now became a long process involving customs clearance and duty across Botswana/South Africa boarders, transport costs and other costs including accommodation and food during the trip to buy raw materials. All these

factors directly contributed to uncompetitive offers in terms of price from local leather manufacturers in Botswana.
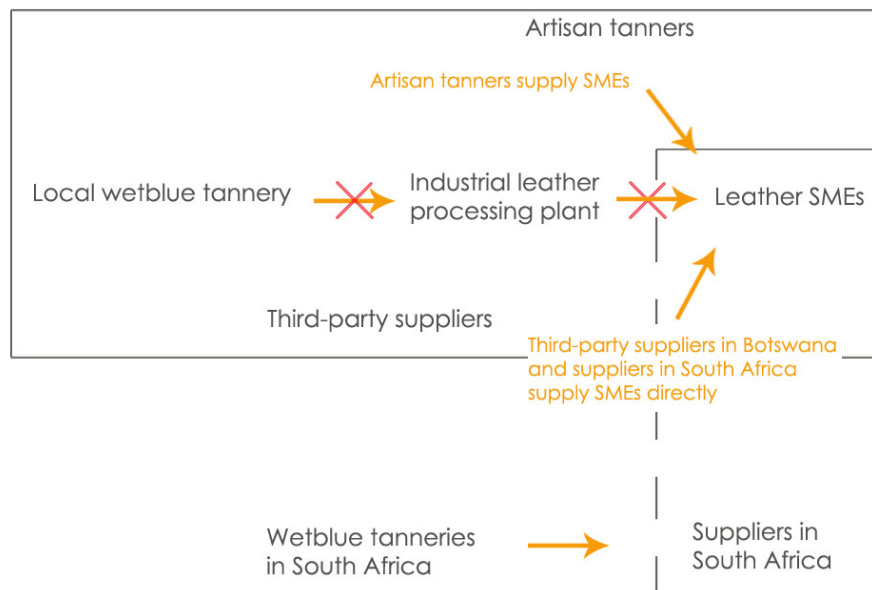
Figure 6-3: Opportunistic behaviours from third party suppliers

6.1.2.2   Upholstery and garments

Although there are SMEs in the tannery business called artisan tanners, most of their products are still of very poor quality for use in making products for very competitive markets. Most SMEs are in the upholstery and garments businesses producing the following products (LEA, 2011);

A. Upholstery

- Furniture
- Car seat covers

B. Garments

- Shoes including safety shoes, casual and formal shoes for men, ladies, and children
- Ladies handbags
- Travel bags
- Belts
- Wallets and purses
- Folders (for events and general purpose use)
- Cell phone and knife pouches

131

Some businesses have also found their niche in other categories not explicitly listed by business development service providers and government policies like the National Export strategy (Government of Botswana, 2010) and Economic Diversification Drive (Botswana Government, 2011);

C. Corporate gifting

- Trophies

- Certificates (engraved leather)

D. Decorative ornaments

- Wall clocks

- Wall plagues

- Vases

Businesses listed above are in product design. There is lack of design influence in the products making them less appealing to customers who often perceive them as of low quality when compared to imports (Sentsho, 2007).

6.1.3   Design

Though skills shortage is one of the main problems in the entire design and manufacturing industry in Botswana, the leather industry has engaged various experts from developed nations to provide training on technical and organisational issues (Mmegi, 2011). This however has not been adequate as the contribution which design can, for example, make in these companies is still undersubscribed, perhaps even underestimated. Various government policies mention innovation as an important element in the leather industry (Government of Botswana, 2010; 2011), including National Development Plan 10 (Government of Botswana, 2007) and other authorities for example Koloba and Moreki (2010), but there is no explicit mention of how this innovation can be driven in a manufacturing context. Design can be explored as a potential driver of innovation (De Lille et al., 2012) and its role in competitiveness of the leather industry further clarified.

6.1.4   Sustainability practices

The primary contributing factor to the problem of costly raw materials for manufacturing was lack of sustainability practices in the local wet blue leather tanning industry leading to negative environmental impacts. This was the main

132

reason why it closed down due to its negative environmental impacts posing a 'threat to public health' (Piet, 2011). Lack of sector specific environmental legislation and standards meant that the tannery did not have reference point in coming up with an environmental impacts management strategy for its operations (Paya, 2006). This had a severe impact on the downstream industries relying on supply from the tannery.

There is no evidence of sustainability practices from leather manufacturers. This is mainly due to lack of knowledge and awareness of sustainability practices and how they can contribute to improved economic benefits especially in terms of cost savings from buying virgin material, and in environmental benefits in terms of material and component recycling based on design and manufacturing decisions. The companies continue to operate in complete isolation from each other which denies them the potential benefits from possibilities like purchasing consortiums, cooperatives and clusters as well as solution oriented partnerships (Manzini et al, 2004).

6.2   Bounding the case

The case study reported in this chapter followed the Delphi study conducted in the context of Botswana which identified priorities defining contextual considerations for SMEs to adopt PSS as their competitive business strategy (See chapter 5). The need for a more focused investigation with a specific sector led to selection of SMEs in the leather industry. The leather industry was selected in line with the country's National Development Plan 10's (Government of Botswana, 2007) economic diversification and entrepreneurship placing emphasis on SME development with the leather industry as one of priority sectors.

This has been further substantiated by the specific focus on the first target of development of the leather industry in Botswana mentioned in section 6.1. In order to bound this case study, the case was competitiveness experiences of SMEs in the leather industry and their perceptions of sustainability and product service systems. The units of analysis were SMEs, making this case a single case with embedded

multiple units of analysis. The context was Botswana. Methodological details about this case study can be found in chapter 4.

The purpose of this case study was to **explore** *competitiveness experiences of leather SMEs and their perceptions of sustainability and product service system.*

This chapter therefore pursues the following objective and research questions;

Objective: *An exploration of competitiveness experiences of leather manufacturing SMEs in Botswana and their perceptions of sustainability and Product Service Systems*
Research questions: *(1) What are activities constituting experiences of SMEs in the leather industry leading to their competitive advantage or disadvantage?*
(2) How do SMEs in the leather industry understand sustainability and product service system?

The focal areas of the exploration in this study were directly from the Delphi study concerned with understanding SMEs' socio-economic context in which they operate, issues to do with SMEs' innovative and differentiation capabilities, barriers and drivers to resource efficiency and opportunities for PSS in the leather industry. Direct interactions with SME owners/managers and other sources of evidence about the leather industry in Botswana were deemed necessary to allow a holistic understanding of both negative and positive activities contributing to SMEs' competitiveness.

The aim was to carry out a diagnosis of factors affecting SMEs' competitiveness mainly from their point of view SMEs. Findings from eighteen interviews conducted with SME owners/managers and evidence from newspaper articles and government policies make up the main contents of this chapter. The introduction section of this chapter is mainly compilation of evidence from newspaper articles and government policies. Contributions of this study are drawn in two ways: (1) implications of SMEs' experiences on their competitiveness, and (2) implications of SMEs' perceptions of sustainability and PSS on their competitiveness. Further these

implications are interpreted in the context of whole systems design and translated into a framework to demonstrate areas of focus to make an impact.

6.3   Findings

The resultant themes from analysis provided rich insights into value creation context of leather manufacturing SMEs in Botswana describing factors contributing to their competitiveness dynamics. The findings show the main issues and discuss how these issues have a bearing on each other. The following sections provide a discussion of problematic areas and highlights areas of opportunity across six main themes.

6.3.1   Competitiveness

Poor market performance of SMEs' products seems to be their biggest concern. Although this is generally well acknowledged, there is little SMEs are doing to address this problem evidenced by their relaxed approach though an awareness of what the problems are exists. SMEs tend to worry about the time their products take to the market. SMEs' production methods are still traditional as most of them still do handcrafting. Although this is seen by some as a differentiation approach it is well acknowledged that it takes time to finish one product. This also often demands very high level of craftsmanship which not all of them possess. To avoid making mistakes, which can then lead to loss of materials, the process is done slower to ensure accuracy of crafting and improved product quality. Where technology is used it is still very low to intermediate due to lack of skills and finance to invest in high and efficient technology. In the process, foreign companies are able to launch their products quicker because of technology assisted product development.

> *"Those guys outside have machines that can shape leather nicely. Here we do it by hand. We do not do it professionally. So you can pick a lot of discrepancies in the workmanship like knitting and where glue was applied. You see these shoes? [Points to my shoes] These were put in a machine. There is a pattern that is nicely put together before you join it to the sole. This is different from the way we do it here"* SME H owner/manager

Evidence from documents showed that Botswana's open market economy exposes small companies to foreign competition. Botswana's economic freedom is one of the highest in Southern Africa attracting foreign investments which offers foreign companies low rates of tax among others. This has resulted in an influx of foreign companies opening shop outlets selling the same products as local SMEs but with better product quality. This has largely frustrated SMEs who target large businesses operating in Botswana to buy from them. These businesses usually prefer to buy from these foreign big companies in the country and some even outside the country.

"Those people running lodges do not want our products. If I were to give you an example with Company X, they don't buy these sofas from us. They go straight to Johannesburg and get their sofas made there. Is this not what discourages us? Out of 100 lodges, why can't I have them trying out at least 2 beds I have made while they are my target?" SME L owner/manager

6.3.1.1   Complacency

There is a huge sense of contentment among SMEs about their business operations and their products. This position was often characterised by baseless statements that there was no one else doing the same thing or even better. Worst of all most companies did not know their annual turnovers except only few who also gave estimates further demonstrating that there was no systematic way to record their annual performance which would otherwise be a believable way of justifying such claims. These claims are based on self-proclamation of talent which hinders exploration of other opportunities like collaborations that can improve their competitiveness.

"I believe the person who can beat me would have learnt from me. That will be my competitor. But if I don't want to show them there's no way they can beat me. That scares me because in this business at some point I will have to teach other people. What am I going to do? I am going to fail to manage my orders" SME N owner/manager

136

"I haven't done anything. What I have I believe nobody can supersede me. We can be at par. I haven't seen anybody who can beat me in the past 5 years". SME R owner/manager

This relaxed attitude often contributes to seasonal sales and production, where most companies focused on products with selling potential only in some seasons of the year like summer or have had customers who bought in bulk but still felt the existing customers brought satisfying sales. This contentment with small markets slows their growth as it demonstrates lack of progressive thinking capabilities for new opportunities and new markets.

6.3.1.2   Cheap imports

Economic freedom discussed earlier in this section has led to an invasion of cheap Asian products. These cheap products have appealed to a lot of customers who consider price as a primary factor for their purchasing decisions. As widely reported across many newspaper articles, cheap Asian products have served a large portion of the population well who often do not have money to afford other products otherwise characterised as fashionable and expensive. Although largely affordable there are a lot of problems with these cheap imports which break too easily and too soon.

"Many people buy from XX. XX produce good finished products but the quality is poor. It looks appealing but poor in quality". SME E co-owner and designer

Some SMEs also observed that most customers cannot differentiate between genuine and faked material which leads to them falling for these products often looking like leather products while in fact they are not. Manufacturing costs in these Asian countries where these companies come from are known to be cheap by SMEs. These companies can then afford to sell at lower prices beating the price of local manufacturers who have to recover money from costs of material and manufacturing. Big retailers who are mostly from South Africa also buy from South African companies often making it difficult to penetrate this market as decisions are made from home.

"Our manufacturing cost is more than India, is more than China. Our key market which is boutiques and small shops, prefer going to China. They buy a pair for 40 bucks instead of 100 bucks here. The mark up is very huge. The same thing applies to bags. They buy them for P100 and sell them for P1000. With me you are going to buy that product for P500/P600. For chain stores the market is also fixed through South Africa. You have go through a buyer in South Africa; Cape Town, J'burg, Durban" SME C owner/manager

6.3.1.3   Brand awareness

Interestingly almost all SMEs are aware that one of the reasons why their products do not do well in the market is because people do not know their companies. The reasons advanced for this were all tied to lack of financial resources to embark on rigorous marketing campaigns for example. Building awareness has led to almost all SMEs having common routes to market. Confessed by SMEs themselves and reported by several newspaper articles, SMEs use exhibitions, trade fairs and other shows as a way of getting themselves known and opening market opportunities. These events are often well attended by individuals and companies both locals and from other countries. If they are known, SMEs believe that they would be identified by their products leading to growing markets through a snowball effect among customers.

"We are still very small…..we are trying to make a brand and be known…. The product will be my brand…….you will know this is a product from [SME B]. They will know where they are produced". SME B owner/manager

Most companies who reported increasing their brand awareness as an opportunity for competitiveness tied it to customer loyalty since they would build trust in their products.

6.3.2   Interpreting design in SMEs

Design is hidden in SMEs. There is no explicit design approach nor systematic or tangible design tools that decisions about products and material selection for

example are based on. The design stage is almost rushed if not skipped to the final product. It was also observed that most SMEs' workshops did not have any space dedicated to design work. In most cases the small factory shells were filled up by work benches and a pile of materials and hand tools. Where office spaces were available, these were largely for daily business administration and storage for other documents. SMEs designed by doing.

> *"Most of our products are never one strict product from start to finish. Is either we throw in different colours with every one that comes out or we change the style of finishing…… You have to throw in every little idea into the product"* SME I owner/manager

> *"I never sketch. I do final pieces and they are never returned"* SME N owner/manager

This lack of communication at early stages of product development leads to SMEs taking risks in producing a finished product before they know how people feel about it. As a result most of their products turn out not to sell. Stockpiling was observed in most factory shells as people did not buy the products. Most SMEs attributed this to lack of market yet they acknowledged that they did not know what people want.

> *"I don't know what to do to know what people would want. Maybe the other thing is I do not know my customers yet such that I could say they like products made this way"* SME Q owner/manager

Evidence of design coordinating product development activities, even though unconsciously, was observed from how a product was put together from input of different people. In some SMEs this was called *team work* whereas in some it was called *putting things together*. Some SMEs recognise the importance of design in their businesses as well as their incapability to act as some.

> *"This business needs a designer and we are not designers. When people get interested it becomes easy. The designer attends them and comes up with a*

product that meets their needs. Now we have a problem since we do not have designers" SME J co-owner and manufacturer

6.3.2.1   Innovation/differentiation

SMEs recognise the need for them to differentiate their products. Being innovative among SMEs was heavily inclined to handcrafting embedding cultural values. Since this is a skill depending on how well one executes it, those who do it well are able to sell to markets interested in high quality products that are well handcrafted. The tourism market was repeatedly reported interested in handcrafted products since these were taken to be souvenirs. However the small tourism market size worsens the competition problem as the products are usually the same or slight variations of others. There appear to be a lot of follower mentality which is as good as copying. This is often attributed to keeping up with trends. This mentality is usually reactive to what is already in the market, *the in thing* phenomenon.

> *"We find out what the in thing is and what is next after the in thing. Sometimes you can be a day or two late such that by the time you finish the product it is out of fashion already"* SME C owner/manager

> *"You have to know what the colour in the market is, sizes of bags….. You just have to inform yourself about what is going on in the market"* SME R owner/manager

 Some of these companies copy well established brands which sell very well in the same product line.

> *"….a bit but not much. Most of our school shoes are similar to Bronx…….We are mostly using one pattern similar to Toughies but not exactly"* SME M manager

Notwithstanding this copying, the products are still highly priced due to issues mentioned in sub-section 6.1.2.1.

6.3.2.2   Product development approaches

Product development approaches used by SMEs vary from not involving the user to user centred approaches like customisation, the former often regarded as a way of shortening time to market characterised by wrong perceptions about customers not knowing what they want, the latter favoured for its suitability to serve in a small market increasing customer loyalty through building long term relationships where customers have had positive experiences in the previous offering/service they received from the company.

Most SMEs use a producer-oriented approach. This is largely driven by lack of knowledge of user centred approaches and labelling them costly and time consuming. The ability of the producer to make a product, which in most cases was the reason the businesses were started is regarded by SMEs as more important than needs of customers and they are taken to have little or no knowledge of what the offering should be. This approach has largely contributed to the problem of stockpiling mentioned earlier. Subjective decisions by customers of liking or disliking a product could not be justified by SMEs as they did not know what users need before making or launching a product. SMEs tend to make a product first then look for a market for the product. This is seen as a way of showing some element of seriousness and getting involved in business. This places SMEs in a position of being hopeful of a market for their products which mostly proved not to improve sales.

In recognising deficiencies of a producer-oriented approach most of them started involving customers in the development process. As a way of involving users, most SMEs preferred producing a sample to show to potential customers who would then give their feedback for further improvement. This approach to user research was seen to be a possible solution for stockpiling and competition from cheap imports.

> *"…need to investigate and find out from people themselves what they want instead of me making a product and imposing it on them. They might not buy because it is not their idea….when looking at my sample I think it adds value and*

141

they can get back to me [referring to customers preferring their product over competitors]" SME O owner/manager

There was a growing tendency of customisation observed among SMEs. However, the way they do it also appears flawed with copying as customers often bring existing products that they would like made. This further aggravates this problem as some SMEs end up reproducing the item to sell to more people. The slightest variation SMEs make to these products are usually in terms of colour. Another way in which SMEs do customisation is through jobs with some strict specifications. Some SMEs have been engaged by government departments and other organisations to make some gifts and presents for various events, competitions and trade fairs. Specifications from customers have posed design challenges to SMEs who could only think of incorporating cultural values to mostly existing designs.

6.3.3   Relationships and the role of main stakeholders

Despite multitudes of problems reported by SMEs which appear to be similar across almost all companies, there is little attempt in working together to cultivate a friendly and collaborative business environment. There is a huge dimension of individualism which makes SMEs even less competitive and more costly for them to run their businesses. Most SMEs purchased materials from similar suppliers in South Africa but often buy individually increasing transportation costs, individual customs duty payments which could otherwise be lowered through an organised purchasing consortium. There is a huge element of lack of trust among SMEs often contributing to negative perceptions about collaborations and ignorance of benefits thereof. However, this has mostly emanated from negative experiences SMEs have had with others in the past as well with suppliers.

6.3.3.1   SME-SME relationships

A lot of harm appears to have been done to these relationships such that there is little hope even attempts made to repairing them, leading to increased individualism. Dishonesty among SMEs in previously tried small-scale collaboration has done harm between them. A few of SMEs who had tried collaborations experienced no payments from primary partners and stealing of their business ideas. Since these

agreements were informal SMEs got disgruntled to take action against perpetrators and instead distanced themselves from such relationships.

"Yah! Yah! Yes I do [referring to collaborating] but the fruits are bad. When making a sofa and encounter a problem with my machinery, come to you to ask for using your machinery to finish my job, you then come to me to ask me to teach you how to make a sofa. Then you leave your tent making business and change to mine!" SME H owner/manager

"Somebody had a big order……and we supported them. The agreement was when they get paid they will give us our part. We have not received payment even up to this day. This is the reason we are reluctant about collaborations". SME F cluster member 3

Despite these negative experiences among some SMEs, others reported positively about collaborating. In those instances, some factors were considered. Collaborating partners were regarded as knowledgeable people and they had known each other for a long time to build trust amongst themselves. These partnerships brought the benefits of skills complements improving product quality and differentiation and financial support often needed to purchase materials and pay rented retail. Many SMEs also saw collaborations in a positive way for the largely for the same reasons that existing one had as well as increasing their production capacities for bigger jobs, increasing market share and affording to lower prices.

"Collaborations are very important. I gave an example earlier about sharing costs of purchasing raw materials. Even paying rentals for shops in South Africa becomes cheaper". SME B co-owner and product development manager

"Collaborations can be helpful in so many ways.... obviously if you collaborate with somebody you learn from that person and you give out what you have. The result is something bigger and better. This ensures that you sell your products at better prices and even get good market as you now are now producing better

quality…… One can bring in money and the other can bring in skill". SME A owner/manager

6.3.3.2   SMEs-Customers relationships

Generally, SMEs value their relationships with customers. Most of them reported positive relationships with their customers especially that it was hard to find them. Keeping them was the most important thing. For this reason SMEs offer services after product sale to build long term relationships increasing loyalty to their offerings. Services include guarantees, complimentary gifts especially for those who buy in bulk, maintenance and repair services.

Negative experiences have been reported in cases where SMEs could not agree on price with their suppliers leading to terminating that relationship. Since imports offer customers cheap alternatives, they often want to negotiate prices of locally produced goods, in which case SMEs would have run at a loss. Challenges with unreliable supply of materials have also lead in some instances to customers rejecting the products and demanding their money back leading to SMEs running at a loss as they often required customers to pay some deposits to enable purchasing materials.

> *"When people get interested in the same product sometimes I struggle with getting the very same material. Sometimes they commit me by paying deposit. When I do not find the same material they saw and use the closest match they sometimes reject the product and demand their money back. That's a challenge as with that money I would have bought what I thought was a closest match to what they saw. Giving them back their money is a setback"*. SME L owner/manager

6.3.3.3   SMEs-Suppliers relationships

Since closure of the local tannery most suppliers are based in South Africa. There are third party suppliers in Botswana who sell expensively as they also get materials from South Africa but need to make profit. This opportunistic behaviour makes SMEs easy prey to third party suppliers, especially those SMEs who are either afraid of travelling to South Africa because of crime or do not know logistics of buying

outside. As sources of raw materials, suppliers are viewed as important actors in the value chain.

Many SMEs observed that suppliers often dealt unfairly with them. Suppliers sometimes make SMEs pay for materials that are out of stock and keep them waiting for a long period of time. By the time materials arrive SMEs would have either lost the business to competitors with materials, received wrong materials they would have to settle for since taking them back would be delay in business or there would have been changes in currency affecting the amount to be paid as custom duty. SMEs on the other hand have hardened conditions of their relationships with suppliers as they had defaulted paying in the past where they acquired materials on credit. This has resulted in suppliers now demanding to be paid at the point of sale. Despite these challenges positive relationships still exist often relying on transparency of communication.

> *"Sometimes they [suppliers] know they do not have the material but tell you otherwise. You write an invoice and pay then your customers wait, sometime you will be working on a valuable government tender…......they [SMEs] take goods telling suppliers they are from Botswana. They get here they do not pay suppliers…we work on hard cash now. Batswana are dishonest people and they have changed the system [purchasing on credit system]"*. SME D co-owner and product development manager

6.3.3.4   SMEs-Government relationships

Government is one of the main stakeholders for SMEs in several ways. Government is responsible for development of the entire SME sector. To this regard, government has set up a national branch support network largely used as a repository of knowledge for general SME growth and development. a widely appreciated initiative is the 85:15 subsidy, where SMEs pay only 15% towards their training needs. The government agency responsible for the network has also introduced the incubation model to support this function. A specialised leather incubator exists. Another government agency is responsible for funding SMEs with promising business ideas. These agencies usually work hand in hand. In addition to

these roles SMEs also see government as a market for their products. Government as market has largely been viewed by SMEs as positive support to help them grow and have capacity to explore other markets.

> *"We need to convince government to give us this bid then we can do marketing outside the country".* SME M manager

SMEs also call for government support in terms of legislation protecting them against external competition and creating an affordable certification system for them to acquire standards like ISO 9000 and EMS through Botswana Bureau of Standards (BOBS).

6.3.3.5   SMEs-Other organisations relationships

Other valuable relationships include those with financial institutions which though reported to have been harmed by SMEs' dishonest behaviours is reported across many newspaper articles to have been improved. Financial institutions are made financing schemes for SMEs to be able to fund their businesses for various needs. Possibilities of overlaps between the leather and textile industries have also been reported by SMEs. Some SMEs have been invited to fashion shows with their products, particularly ladies handbags. This collaboration has been viewed as a possibility for new markets though still unexploited.

6.3.4   SME business environment

Most SME businesses started doing something different from what they do now. It was observed that most of them started doing repair services or buying related products to sell. Often the businesses have evolved around products to which services like repair and selling were offered. As SMEs moved into manufacturing most of them got rid of services and focused on producing and selling physical products. However services were still offered as and when customers requested them but not as an integral part of the business.

SMEs that started doing shoe repair have either moved on to shoe manufacturing or manufacturing bags. SMEs that started selling leather products also ended up

manufacturing them. These iterations in the businesses were motivated by lady customers happy with the quality of shoe fixing and suggesting manufacture of other lady products like handbags in the former. In the latter it was often the case of selling to a bigger market like he government who could only buy when the goods were manufactured locally. Other businesses were also started on unclear intents, a behaviour observed to be cascading to start-ups.

> *"My thinking was I am going to do clothing and integrate leather in them. While I was there [a government organisation offering training on basic leather manufacturing] I got interested in bags. When I finished I registered my company as manufacturing a range of products to give myself room to identify what am close to".* SME Q owner/manager

This lack of a strategic approach to business development has contributed to a lot of problems including products not selling and SMEs assuming they know what people want as discussed in sub section 6.3.2.2. It seemed apparent that most businesses were started on hope that people will appreciate what they offer and buy, making them vulnerable to competition.

6.3.4.1   Resources constraints

SMEs operate under adverse resources constraints. Widely reported constraints regarded availability and cost of materials, limited finance right from funding to start the business to running capital, lack of technological equipment to improve product quality and efficiency in manufacturing and lack of human resources. This situation contributed to time consuming product development processes in most SMEs leading to delayed delivery when compared to competitors who used advanced and quick technologies.

Almost all SMEs are aware of availability of leather in Botswana. This has also been reported across many newspaper articles although the quality of the material was still suspected to be low due to most cattle being kept under free range system and branded on the skins. The closing the tannery discussed in the introduction section has adversely contributed to high costs of imported material and unavailability due

to supply issues mentioned in 6.3.3.3, and occasional problems beyond their control like industrial actions and fuel shortages often limiting their movements to get materials.

> *"Leather is not easily available in Botswana. You will always hear that this piece was from South Africa, this one was from such and such a place"*. SME H owner/manager

> *"To source the leather is expensive; to go and get the leather is expensive; to get the right leather is expensive"*. SME C owner/manager

Limited finance often resulted in SMEs aiming to survive. Surviving has in some cases distracted SMEs from their main product line to small items like belts, cell phone pouches which were sellable through a door to door approach. Financial limitations have forced SMEs to close down in strategic locations and open their operations where there were cheaper utilities to pay like rent, water and electricity. Purchasing machinery and engaging professionals like designers acknowledged to be needed is prohibited by this limitation.

Only a few SMEs were happy with their level of skills in business management and design and manufacturing. Generally it is a requirement for SMEs to have a beginner's course in leather works for their funding to start a business to get approved. This basic knowledge is there in most of them. However it is very limited as it is mainly focused to hand making skills and use of basic machinery to complement hand making skills. Business management is still a challenge as most of them do not have proper training in business management, contributing to lack a flexible ad-hoc management style easily derailed by social errands sometimes spending business money recklessly. Confidence and quality of decision making is often low except among very few who feel have been rigorously exposed to both business management and leather manufacturing processes.

> *"We were taught management…. I hire highly trained professionals who are expensive to keep, some hire cheap labour. My books [business accounts] are well*

148

maintained… Batswana should be encouraged to go for training…be cultured to travelling and observe how fully fledged factories operate". SME D co-owner and product development manager

6.3.5   Opportunities for sustainability

Almost all SMEs have come across the word sustainability in various government campaigns of building a sustainable and diversified economy. The common media for this information was reported to be the radio and various television programmes. Despite the frequent use of the word, all SMEs could not link it to their businesses nor have ever thought of possibilities to incorporate sustainability practices into their business operations. However, many SMEs had a clue of what economic sustainability could mean in terms of existence of their businesses in years to come.

> *"Sustainability means that at the beginning you fund your business then it stands on its own to continue existing. The other thing is along the way you should be able to leave with situations as they arise. If you were thinking of making casual shoes and it appears people want formal shoes you go with them. I think that is sustainability; that you don't get swallowed by arising circumstances. Be it financial circumstances or the market. You have to face the situation and come up with ideas that can keep the business existing".* SME A owner/manager

This limited knowledge of sustainability and its significance in SMEs businesses was observed in the amount of valuable waste in most of the factory shells. Only a few reported efficiency in their use of materials, remaining with very small pieces which were occasionally put to secondary uses such as making small items like ear-rings, bracelets and necklaces. This secondary use however was not viewed as a way of starting up sustainability practices but behaviour copied from industries that made those small items out of leather.

Only one SME saw the soon to be introduced recycling policy by the government as an opportunity for a business driven by sustainability. This SME reported that sustainability was the reason they set up the business as they recognised the value of materials and products thrown into the land fill which could either be refurbished

and reused or material recovered for recycling. Evidence of this sustainability strategy in the SME was only an idea not laid out in any form with no execution guidelines. This idea also extended to social sustainability where communities will also participate in the business by processing most of the material during recycling though unclear as well.

> *"Environmental sustainability is what attracted me to this business because at the moment I do waste collection. What I realised was we throw away things we could be using again and reduce the load on the environment…….*
>
> *……..The government has also resolved to make policy on recycling. I can also take advantage of that. Maybe that is when people can see the importance of recycling; that is does not mean a worn out item not being thrown away but something that can cause harm to the environment which has been used again to come back to people".* SME G owner/manager

6.3.5.1   The role of sustainability practices

Despite this lack of knowledge about sustainability and its significance to their businesses, most SMEs reported sustainability practices being relevant to their businesses. Reported possibilities were in terms of giving products a second life through remanufacturing, material recycling of leather for creative use in new products and minimising waste through systematic way of cutting materials and amount used in products. Operationalization of these initiatives appeared to be tied to design capabilities which SMEs do not have as reported in sub section 6.3.2. Despite mostly being reported a possibility the means to put it to practice was ill defined.

> *"I do believe I can have a way of improving them so that they can sell again. I can start thinking along those lines".* SME R owner/manager

A product take back strategy was highly favoured in order to facilitate these initiatives as a way of gaining customer trust and recovering materials. Most SMEs were aware of several ways to recondition leather to a believably new state. They also believed leather recovered from used products could be used in the state in

which it is as a way of stylising the product. Some SMEs felt product take back could be facilitated by public education to sensitise consumers of the possibilities of new life from old products.

> *"The public can be given that education to sensitise them of taking back products when they do not need them anymore. This would make materials available to us and even inspecting conditions of products to decide on remanufacturing or recovering materials completely. We will still need to change the patterns even if we remanufacture"* SME F cluster member 1

> *"I can take leather back and do something else. There is a way in which leather can be reconditioned…..I do not think recycling leather can be a problem".* SME O owner/manager

Despite this widely reported welcome of sustainability practices, a few of the SMEs interviewed felt that environmental sustainability was for big companies and would only be ideal to them in the event that the business grew. Others took this position as they reported non availability of companies who can be able to handle material recycling needs as it could be time consuming for them to do it themselves.

6.3.5.2   Engagement with sustainability viewed in economic terms

The benefits of sustainability practices were only viewed financially. This was mostly driven by cost of raw materials, which were being imported after the resent closure of the local tannery. Even if environmental benefits were reported they were not really the main drivers for thinking of taking up sustainability practices. Several financial benefits like recovering costs through selling waste to secondary industries, reducing frequency of buying virgin materials, increased profits from selling recycled and remanufactured products and increased market as products become more affordable were reported by almost all SMEs. This approach was seen as an option to offer lower prices to customers who were often enticed by lower prices offered by Asian competitors increasing resilience of SMEs with its ability to keep SMEs in business in a fierce competitive environment in which they operate.

"On our side it is an issue of cash cow; that little cash that keeps us surviving…the price of the product will go down….refurbish, clean or replace other parts where you feel necessary…... The volumes start to increase and sustainability starts to play a major role" SME C owner/manager

6.3.6   Is PSS a viable option?

SMEs generally saw PSS as a suitable strategy. Introduction of the concept got them exploring service possibilities for their various products. Only SME R reported PSS as a strategy suitable for big companies only. In the company the owner did everything with occasional part time labour. Almost all SMEs reported need for mind-set change on the side of customers and the business environment. This included potential funders for promising PSS businesses who would need benefits to be clearly demonstrated to them. Customers would need to be educated on possibilities of not owning a product in the case of use oriented product service systems. Because of likely customer behaviours of product abuse with the knowledge that it is not theirs and lack of honesty to pay as per agreements, some SMEs had mixed feelings about adopting the strategy. On the side of SMEs there appear to be little mind set concerns as most of them immediately related the concept with similar offerings in the service industry.

6.3.6.1   PSS opportunities for SMEs and customers

For SMEs PSS would help making offerings affordable to customers in the event that they get their products on contractual agreements or subscribe to services offered after point of sale. In most cases this was tied to the sustainability voluntary product take back strategy which would enhance their relationships with customers and enable material recovery. Existing relationships with customers were viewed as a good starting point for this novelty. In this way to SMEs sustainable PSS was viewed as a source of consistent income, cushion to high costs of raw materials and avoid stockpiling. In some cases this financial benefit is closely related to their motivation to adopting sustainability practices.

"The idea can work for us since we want to go green. There are a lot of issues to consider; time, energy and so on. We can think of a way of using that in our

company. If say you lend out your attire to a choir and they win that can be a selling point for it. The benefit there is the attire has contributed to the success of an event". SME G owner/manager

For customers PSS offers an opportunity to afford products they may have not afforded to buy before. This was equally relevant for customers who were institutions buying from external funding often experiencing some delays in getting their money. Giving people products on conditions of little monthly payments was seen as an accommodative strategy for people who may be financially stressed but interested in the products/services.

"Very relevant; some people like good products but do not have cash to buy at the point of sale. If it is an affordable arrangement they will be able be buy". SME F cluster member 2

This arrangement would give customers a voice in what way they desire their needs to be met, increasing their involvement in the product/service development process.

6.3.6.2   Possible types of **PSS** and **PSS** market for SMEs

Because of their position on PSS, SMEs also suggested various product ideas which could be suitable and disqualified others as not suitable. Various product ideas were tied to various services. Although these were quickly thrown around during the interview sessions SMEs strongly felt that given time to explore the concept more business opportunities would come up.

Product oriented PSS

With the natural orientation of manufacturers to producing and selling physical products, the first PSS ideas were inclined to offering services after point of sale. These services included product care and maintenance. SMEs believed this kind of services would give them an edge over competitors who they claim are able to sell their products cheaply because they do not use genuine material. Product ideas for this PSS category included furniture, ladies hand bags, shoes and ornaments.

153

"The way I understand it, let's say if I make a chair, I can talk to a customer that the chair can only be cleaned here with specialised chemicals. This will come at a price, even polishing. Leather is a very complex material. Television adverts sometimes mislead people and destroy people's products. Since I will be the manufacture this will put me at an advantage as I will be on site. I will also stipulate conditions at the point of sale. It can work for me. Even for those that we had not manufactured for will know we do take good care of leather. We use a lot of leather and can be able to tell what genuine leather is and what is not even when it is time to change the leather". SME E co-owner and designer

Use oriented PSS

The idea of leasing products to customers and having them pay for the duration of use became very popular among SMEs during interviews when PSS as introduced to them. This arrangement was favoured for its likely benefit of consistent cash flow every month for the duration of the lease. SMEs who were already thinking of selling their products on a credit system where customers would pay deposit then own the product and finish their payments immediately got interested in leasing them to get the benefit of materials coming back to them as well. Some SMEs had an existing credit system only for organisations where government was the guarantor. For some expensive products like traditional attire, this example existed where traditional dance troops used the attire for the period of competitions or other events, paid for use for that duration and returned the attire to the manufacturer. Product ideas for use oriented PSS included ladies hand bags, traditional dance attire and events decorations.

"…to rent out bags for the evening [referring to a fashion show evening] then return them the following day or month after you have shown off yourself with a new bag". SME C owner/manager

PSS market

PSS market was observed to be diverse as SMEs explored its opportunities. The market included individual customers labelled 'socialites', highly fashionable people,

154

big companies, government institutions and events (fashion shows, beauty pageants, exhibitions, meetings). Various PSS product ideas were seen possible with various markets. This is shown in Table 6-3.

Table 6-3: PSS market

PSS market	Product ideas	Sample of evidence
Government institutions	Furniture School shoes for orphans and needy students	*"I think I am going to try leasing out wall clocks to schools for examinations. They don't really need to buy watches"* SME N owner/manager
Individuals	Ladies handbags, shoes	*"You need to interact with people who are highly social and attend various social events"* SME J owner/manager
Highly fashionable people	Ladies handbags, ornaments and clothing	*"For this idea to work I will have to know people from fashion week. They will know what I do since they are people who are after fashion"* SME I owner/manager
High profile people	Bags and ornaments	*"Obviously I'd go for high profile people. I think that's where it could work"* SME A owner/manager
Events	Traditional dance attire, Folders, fashionable bags	*"..hosting a fashion show with my products to appeal to people like beauty pageants and fashion designers who can use my bags for their parades"* SME P owner/manager

6.4   Implications of SMEs experiences on their competitiveness

The current business environment in which SMEs operate makes it almost impossible for small businesses to prosper. The unclear business intents by SMEs coupled with strategic and operational problems also highlighted by Temtime (2008) require other resources to reinvigorate SMEs business practice. For example, design is a direct input of manufacturing (Hague et al., 2003). The absence of design in these SMEs raises a lot of shortcoming in terms of product innovativeness and differentiation. This aggravates the problem of copying among them, leading to lack of or low sales. As a resource for these SMEs, design can play a pivotal role at a strategic level. Although lack of design was just one of the problems identified, introducing design leadership could provide links between these areas in a

pragmatic way. This does not however, suggest that design is a panacea to all problems SMEs face but a possible lens through which solutions can be searched.

Market performance conditions can also be improved by exploiting opportunities in stakeholder relationships and enhancing existing ones. There is evidence from the findings that SME-SME relationships can reduce operational costs and improve access to market. Other opportunities still remaining unexploited include the following.

- SMEs can engage in partnerships geared towards a specific solution or addressing a specific problem. This can have an added advantage of resource maximisation.

- In the case of a solution for a market, there will be a lot of resource sharing in the development process and a combined market of the two SMEs during sales increasing the buying potential for the solution.

- In case of purchasing raw materials this relationship can help cushion the costs of transportation and custom duty as they contribute as per the proportion of the amount they would have bought. This also contributes to reduced environmental impacts of transportation as only one trip would have been made across several companies.

Relationships with customers can facilitate user research leading to meeting their needs in a PSS context and measuring their level of acceptance of products made from recycled material. This relationship will give users a voice in the product/service development such that they are co-producers of the offering increasing its market potential.

Government is a key stakeholder both as a market and as a primary provider of business development services for SMEs. This relationship can contribute in various ways;

- Facilitate provision of specialised services for SMEs willing to be PSS providers

- Provide supportive policy framework to attract SMEs into PSS through rebates and incentives and protect them from competition from cheap unauthentic offerings.

156

- Promote PSS by increasing its market base across its various organisations.

Introducing vibrancy in SME-stakeholder relationships needs facilitation over time. Where other stakeholders are involved, design can coordinate activities in the relationships towards building PSS offerings. The relationships between SMEs and users and SME-SME can benefit from design coordinating capabilities. Other areas of benefit have also been identified.

- To manage competition through differentiation of their product offerings. This will empower them in developing their own solutions and stop copying existing work.
- Design will also be crucial in developing services. Addition of the service component in SMEs creates a complex scenario of two life cycles of the product and of the service to be planned for.
- Creative thinking capabilities can address the issue of complacency to explore new solutions to escape the non-response mode even if SMEs are aware of the threats they are faced with.
- Design can bring in meaningful user engagement as co designers in the development process.
- Design will be essential to serve coordination of the product/service development process. This will also come with the communication capability of design where SMEs use design tools like sketching to rapidly bring their ideas on paper and in an acceptable and communicative way to potential users. This will save them time and other resources in waiting to develop the entire PSS offering only to be rejected in the market.

6.5   Implications of SMEs' perceptions on their competitiveness

SMEs' positive perception of sustainability and PSS appear to be based on income generation instead of entrepreneurship development. This is due to their interest being a reaction to the frustrations they are currently experiencing from competition by giant foreign companies and cheap low quality imports flooding the local market. This perspective of SMEs driven by economic benefits at the forefront

is also suggested by Pimenova and van der Vorst (2004) as the focus for SMEs in transition economies.

SMEs have closely linked sustainability with cost savings benefit. Though this view is purely economic, especially motivated by the conditions in their business environment particularly concerning the cost of raw materials and difficulty to attract customers with cheap offerings, the environmental benefits are also tremendous.

- The product take back strategy widely appreciated by SMEs could be a possible route to low waste SMEs with supportive measures in place. At the moment SMEs do not know how this idea they appreciate can work. The voluntary take up of sustainability by SMEs could be advantageous especially in an environment where currently there are no legislation measures governing environmental impacts in manufacturing companies. This can positively contribute to building resilience in SMEs as improved efficiency in material use and design and manufacturing opens up opportunities for new product and market ideas.

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PSS presents an opportunity for SMEs to explore new markets and a new way of doing business. From the findings only two types of PSS are possible for these SMEs. Product oriented PSS and use oriented PSS. This thinking capacity however may still be limited by their design deficiency.

- The market segments are all local and demonstrate how PSS can help manage competition in a small market.

- The two types of PSS possible in this context rely on identified relationships with key stakeholders. Through these relationships a buy in into the concept is possible as stakeholder benefits also get defined in the process.

- With the sustainability benefit to the PSS, SMEs can save costs especially through the voluntary product take back strategy and provide market for second generation products through development of new service scenarios.

- PSS can move SMEs to dematerialisation as they focus on occupying new value spaces through provision of services instead of selling more products.

- Another visible gap is building customer loyalty as offerings become customised and users feel a sense of ownership over the offerings right from its development.

- PSS can open new markets as SMEs engage with overlapping industries. From the findings it is visible that there are opportunities for new markets between leather and textile/fashion industry.

6.6 Interpreting implications in the whole systems design approach

Based on implications of findings for competitiveness it is necessary to device a way of increasing success chances of possible interventions. From findings, there is need to consider the business perspective of SMEs, exploit relationships, advocate for institutional involvement and explore capacity to compete in SMEs. This is a complex situation which in its entirety describes SME business environment as a system. Interventions need to integrate economic, social and environmental issues and take advantage of relationships as meaningful multi-disciplinary partnerships. The need for design leadership indicated in section 6.4 require that a relationship with design professionals be nurtured to enable SMEs explore design capabilities towards competitiveness through sustainable PSS.

The interconnectedness of economic, social and environmental aspects in these themes requires that a more encompassing approach be adopted (Charnley et al., 2011). This encompassing and systemic approach can be looked at from the perspective of O'Rafferty and O'Connor (2009) discussed in section 3.2.4.4 in terms of their five aspects targeted to design out failure of interventions. Issues relating to infrastructure, institutions, interactions and networks, SME capacity and culture in O'Rafferty and O'Connor's generic framework were interpreted in each of the six themes in order to explore solutions to problems described in the themes in a systemic context.

Each of the six themes were viewed as a pillar to solving problems identified under it, and were thus called System Success Factors. Problems reported by SMEs under the themes were translated as positive statements in order to stimulate a solution

159

seeking initiative. This approach led to developing a framework called the Systems Success Framework in Figure 6-4. The text under each System Success Factors in Figure 6.4 is a sample of issues from themes described in sections 6.3.1 to 6.3.6. According to the findings of this case study, addressing the market performance issue of threats from cheap imports require (1) infrastructural support to enable SMEs produce better quality offered at attractive prices; (2) institutional promotion of designers' involvement in delivering support to SMEs; (3) interactions of SMEs with external bodies to develop resource efficiency initiatives; (4) build capacity to clear business intents by SMEs to focus on delivering specific offerings; (5) and encourage long standing relationships in local and regional markets to promote PSS in SMEs. This interpretation was consistently used throughout the six themes in section 6.3 that were arrived at from the analysis of data collected during the study. In the context of the framework designers are main stakeholders to explore implications for practice described in section 6.4 and 6.5.

Categories	Systems Success Factors					
	Competitiveness	Design	Sustainability	Relationships	Business environment	PSS
Infrastructure	Reduce complacency; Increase innovative responses to threats; Promote brand equity	Create awareness of emerging design for sustainability; Create awareness of design innovation	Promote resource efficiency to combat material cost issues	Create support for design to promote design innovation and sustainability	Develop strategies to cushion material cost; Explore use of locally available material	Invest in strategy creation
Institutions		Promote designers involvement in delivering support to SMEs	Develop policy framework to drive sustainability innitiatives	Develop structured and coordinated partnerships to engage designers	Support design innovation as a means of dealing with material cost issues	Develop policy framework to promote PSS
Interactions and networks		Promote user involvement in value creation	Engagement of SMEs with external support to develop initiatives	Promote links between business networks and designers		Involve designers to demonstrate design of services in manufacturers
SME capacity	Need for use of technology	Develop design capabilities to empower SMEs stop copying	Promote life cycle thinking		Develop a clear business intent	Exposure to design tools and methods to aid PSS design
Culture	Owner/manager's open mind and commitment	Reduce the risk of market failure by engaging SMEs with design	Expand benefits of sustainability beyond economic benefits		Cab ad-hoc approaches through development of owner/manager skills and knowledge	Encourage long-standing links to develop trust

Figure 6-4: Systems Success Framework

161

6.7 Conclusions

This case study has successfully provided insights into major issues that need to be pursued in order to address competitiveness challenges of SMEs in the leather industry in Botswana. The study has answered the second objective of this research project.

An exploration of competitiveness experiences of leather manufacturing SMEs in Botswana and their perceptions of sustainability and Product Service Systems

Further, the study has proposed a framework through which the role of design can be explored to address these challenges. Across each category and theme, SMEs would need to possess certain capabilities in order to operationalise the positive statements of the framework. This chapter has explored and described the gap in capabilities of Botswana leather manufacturing SMEs in coping with a competitive business environment. The following conclusions make observations further connecting findings to the systems success framework as a deductive way of demonstrating its usefulness to the case SMEs.

- In all the SMEs there is need to increase engagement in innovation activities and use of technology to reduce complacency with small gains and the follower mentality. There are varying levels of complacency across SMEs as some are able to use their long developed capabilities to their advantage. Currently there appear not to be any innovation interventions for SMEs, which could support structured and coordinated partnerships to engage designers and offer design innovation to drive SMEs to new and emerging trends in product development.

- Creating design awareness in SMEs would not only contribute to the building differentiation potential but also build other related capabilities. Taking advantage of their positive perception of sustainability, sustainable design capabilities can be developed together with traditional design capabilities. Generally there is low user involvement in SMEs' product development approaches which largely contributes to poor sales. User centred design approaches could close this gap.

162

- The extent to which SMEs engage in collaborations appears to be shaped by their level of trust and comfort with potential partners. Negative experiences from tried and failed collaborations appear to have implanted scepticism in SMEs even though some reported positively on collaborations. This could make future collaborations with other members of the business community challenging.

- There is no clear business strategy across all SMEs, making their approaches ad-hoc with less consideration for long term effects. An involvement of designers through a strategic design approach could demonstrate differentiation through services in manufacturing SMEs. This can incrementally expose SMEs to PSS and its benefits since they mostly perceived it as a worthwhile route. Most SMEs have potential markets for their PSS offerings although it was not clear at this stage how things could work out.

This study has built understanding of the challenges faced by SMEs in their bid to compete with their products mostly in the local market. It has also shown enthusiasm from SMEs towards developing sustainability practices and exploring the potential of product service systems. With respect to the sample size used in this study, findings cannot be generalised beyond the 18 companies that participated. However, findings have allowed the identification of implications for practice drawn from their experiences, mostly depicting challenges they face and from their perceptions of sustainability and PSS. The evidence has been translated into a framework to allow further testing of these implications practical implications. Through a series of workshops with a smaller sample, the framework is tested in the following chapter, linking these findings to the overarching aim of this research project.

7 Main findings of exploratory workshops

This chapter presents the main findings from exploratory workshops conducted as justified in section 4.7.4 and provides a higher level description of themes and their relationships resulting from the data analysis process. A detailed background of the context in which SMEs operate is provided, followed by a description of the procedure adopted for all the three workshops conducted and presentation of themes.

7.1 Introduction

The overarching aim of this research project is to identify effective and contextually appropriate means through which manufacturing SMEs in Botswana can improve their competitiveness through a design driven sustainable PSS adoption approach. Building blocks towards achieving this aim include understanding of the context of this research in chapter 2, literature review in chapter 3, a Delphi study and a single case study with multiple embedded units of analysis in chapters 5 and 6 respectively. This chapter presents the main findings of the workshops conducted in a solution seeking approach to problems identified in chapter 6. Findings gained in the study also provide insights into the usability of the Systems Success Framework developed in chapter 6. Following on the need to explore the missing relationship of SMEs-Designer(s), a process-based approach is identified. In this approach the main contributions of design capabilities are highlighted together with their impact on SMEs' orientation towards sustainable PSS.

Chapters 7 and 8 pursue the following objective and research question;

Objective: To carry out an in-depth exploration of how SMEs can recognise and apply design capabilities to differentiate themselves by creating sustainable PSS offerings through interactions with sustainable designers.

Research question: How can SMEs recognise and apply design capabilities to exploit sustainable PSS potential in order for them to differentiate themselves?

164

At this stage of the research the focus was to develop an innovative design driven capabilities based approach to supporting entrepreneurship development with respect to sustainable PSS adoption. An interaction between SMEs and designers was therefore deemed necessary to allow designers, as carriers of capabilities, to transfer them to case SMEs, as receptors, in a knowledge co-creation setting. Exploring SME-Designer(s) relationship mainly involved interactions between SMEs and designers in workshops.

Through these workshops, the aim was to illustrate that collaborative engagements of SMEs with designers can enable them address their competitiveness issues through a creative approach. This design-led approach in the process dispenses design capabilities to SMEs, facilitating their adoption of sustainable product service systems. This capability inclined approach to supporting SMEs puts more emphasis to entrepreneurship development rather than income generation even in the case of start-ups, currently assumed to be oriented towards income generation. Findings of each of these workshops and evidence supporting the cases make up the main contents of this chapter. Experiences of each SME are explored in separate sections as these workshops were conducted with each individual SME. A representation of the study is shown in Figure 7-1.
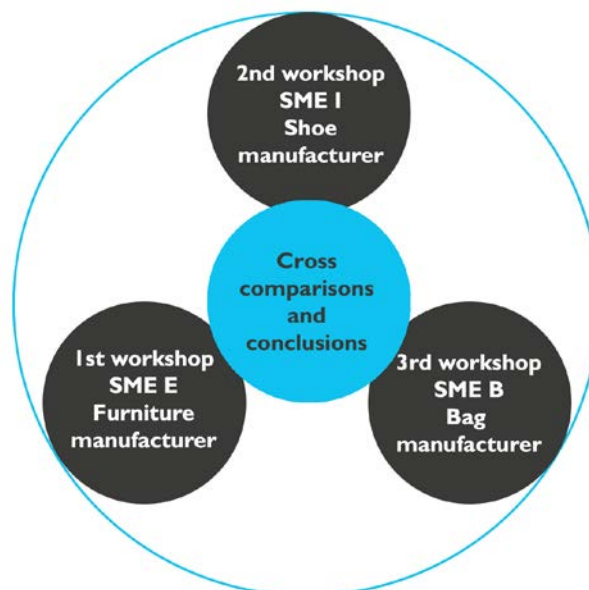
Figure 7-1: Typology of the workshops

7.2 The need for a capability based approach

In Botswana, the Local Enterprise Authority (LEA) has been mandated through the Small Business Act of 2003 to "provide support services to the local industry needs of SMEs, encompassing training, mentoring, marketing and technology support for product development" (LEA, 2007,p4). In their manual of interventions, tools and procedures, LEA outlines their business model through which they deliver this support (LEA, 2007). LEA's model is less in favour of micro SMEs, especially in innovation related support. Segregating micro industries from innovation initiatives leaves them out in growth and development, rendering their business activities futile in today's innovation led business environment. Paradoxically, LEA's national database consists of 80% micro SMEs (LEA, 2009). All SMEs in high priority sectors who are members of LEA are micro companies. This includes all SMEs who participated in this study. The need to support innovation-oriented capabilities can improve value creation dynamics and promote strategy development by micro SMEs.

7.2.1 Support services

The provision of support services is done in two ways. Support is offered through Business Development Services (BDS) and Entrepreneurship Development Programmes (EDP). These can be offered directly to SMEs, to organisations offering services to SMEs and to policy makers to inform policy towards improving support for SME development. BDS provided by LEA are delivered through programmes targeted at addressing problems affecting SME development from start up to maintenance and growth, including competitiveness. Geographically dispersed members of LEA are reached through LEA's branch offices located in various towns across the country as shown in Figure 7-2.

Region	LEA Branch(Region capitals)
Central	Serowe Selibe Phikwe
Ghanzi	Ghanzi
Kgalalgadi	Tsabong
Kgatleng	Mochudi
Kweneng	Molepolole
North East	Francistown Masunga
North West	Maun Kasane
South East	Gaborone Ramotswa
Southern	Kanye
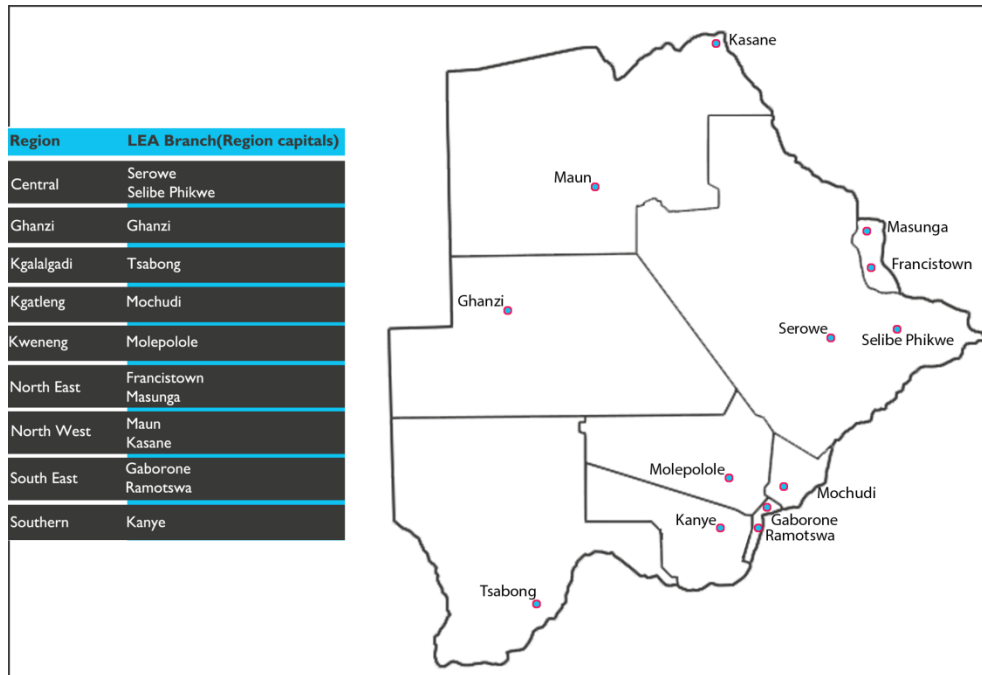
Figure 7-2: LEA's countrywide offices

Offering services to specific sectors is also emphasised in LEA's business model. In line with government policies mentioned in Chapter 6, LEA also offers specific support to sectors identified as high priority sectors with potential to diversify the economy and drive growth. Specific industries in the manufacturing sector like the Leather industry receive enormous support and SMEs in the leather industry to this date are put through a three year incubation programme. SMEs are selected through an application process into the incubation programme. All SMEs who participated in this study are beneficiaries in this incubation programme.

7.2.2   LEA's programme categories

LEA's support programmes are targeted at SMEs who need surviving and so needing income generation support and those that are generally beyond surviving and so needing entrepreneurship development.

7.2.2.1.1 Income generation SMEs

Income generation support is provided for SMEs who started their businesses as a result of social problems like their general welfare and poverty. Entrepreneurs in this category are considered to be in need of money. Support is therefore based on short term interventions intended to help SMEs generate quick income. The

167

limitation with this kind of support is that it promotes survivalistic behaviours. The scope of support is limited to basic business management skills like personal entrepreneurial skills, opportunity identification and basic record keeping. This limited scope seems to leave out the importance of developing capabilities that support the core offering and strategy development.

7.2.2.1.2 Entrepreneurship development

Entrepreneurship development is taken to be appropriate for SMEs who are more driven by market issues such as new opportunities, growth, competition and innovation. Here support programmes address issues of market consolidation and diversification, networking and collaborations, business transformation issues as well as technology and innovation uptake. The orientation of the entrepreneurship development programmes is towards formulation of business strategies by SMEs and looking for new and emerging trends. The so-perceived non-social orientation of SMEs in this category rules out this kind of support to micro companies, where owners/mangers are usually directly involved in day to day business activities.

7.2.3   Income generation versus Entrepreneurship development

In this research project, the need to support innovation-oriented capabilities is important especially towards developing means through which micro SMEs can be able to adopt a sustainable business strategy. Innovation capabilities in the context of PSS will improve other capabilities like networking, collaboration and value delivery, enabling SMEs to offer new solutions and opening new business opportunities (Moller and Torronen, 2003). This is an important inclusion in LEA's entrepreneurship development approach though there is no focus in developing innovation capabilities. The relevance of design capabilities in this endeavour has been argued in Chapter 3. This includes the capability of design being good business, further nullifying a segregation approach towards micro industries often seen as survivalists rather than those seeking growth and development. As mentioned earlier in section 7.2, the proportion of micro SMEs in the LEA database makes it imperative for them to support entrepreneurship development to promote growth and advancement from micro into small and medium enterprises.

7.3   The influence of a collaborative approach

The possibility that micro SMEs can adopt sustainable PSS is dependent upon how design capabilities are deployed over time through collaborations with designers. The motivation for adoption is influenced by SMEs' interest, market opportunities and resources. These factors present the need for situational analysis by designers to be able to deploy appropriate capabilities as per the companies' specific circumstances. This process of situational analysis was started by companies sharing their visions with designers. This approach was used in all the three cases, resulting in different outcomes in each case. Other factors influencing the outcomes included the SMEs' interpersonal skills, educational qualifications and general knowledge. This affected the level of engagement by SMEs in each workshop, varying from passive to fully engaged Figure 7-3). This conclusion was arrived at following data from observations during the workshops and evaluation interviews with designers and SMEs themselves.
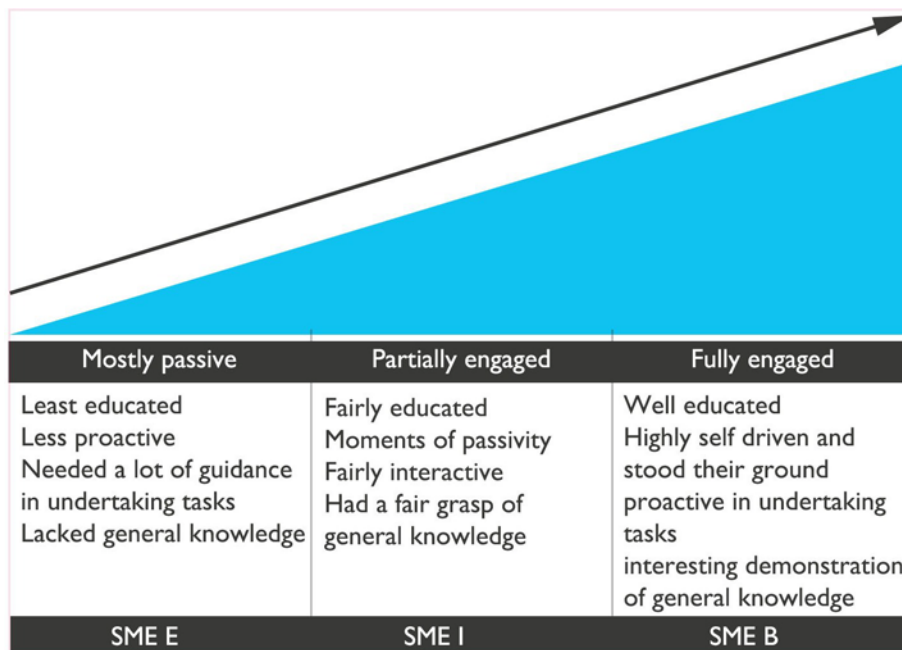
Figure 7-3: SMEs' characteristics and levels of engagement

7.3.1   Workshop procedure

Pilot study

Prior to the main workshops, the protocol was piloted with a group of undergraduate design students at the University of Botswana. The same designers

used for the main workshops were used during the pilot study. Further details about pre-study meetings held with both designers and SMEs and their purpose are available in Appendix D.

The purpose of the pilot study was to trial the programme and its activities, as well as check the level at which the content should be pitched. Though the pilot sample composed different characteristics from the main sample, their understanding and completion of activities within the stipulated times was believed to give a good indication of the main workshops. An indication of the workshop procedure is shown by the programme in Figure 7-4.

Time	Activities
08:00 - 08:10	arrival, intorductions and housekeeping
08:10 - 08:15	quick introduction of the workshop and its purpose
08:15 - 08:30	Activity 1: Lost on a Desert Island
08:30 - 09:00	Presentation
09:00 - 09:10	Brain dump
09:10 - 09:40	Activity 2: Linking company goals
09:40 - 10:00	Activity 3: building cusotmer experiences
10:00 - 10:20	coffee break
10:20 - 11:20	Activity 3 continues
11:20 - 12:15	Activity 4: plotting a sustainable PSS blueprint
12:15 - 12:35	activity 5; business pitch
12:35 - 12:45	winding up and closure
	Food time!

Figure 7-4: Final workshop programme

Modifications following pilot study

- The presentation was split into three portions during the pilot study; an introduction of workshop and its purpose with an introduction to design,

then an introduction to sustainability and PSS after Activity 1 and summary of findings from the phase three study after the brain dump exercise. This took a lot of time as the presentations were lengthened by interjections from participants seeking clarity on some issues. The presentation was then compacted into one short briefing on the three issues and only featured once as shown in Figure 4-11.

- The initial programme before the pilot had six activities with activity 3 dedicated to the design of the product supporting a service offering. During the pilot study this activity took a lot of time and the rest of the programme was rushed. Although focus on the product itself was good, during development of customer journeys, the group kept suggesting improvements to the product as a result of exploring user experiences. The product was seen as an integral part of customer experiences and focus was then dedicated to customer experiences.

Main workshops

Removal of the activity on product design and shortening the presentation changed and shortened the programme used for the main workshops (Figure 7-4). Some sample activity outcomes are shown in Figures 7-5 and 7-6.
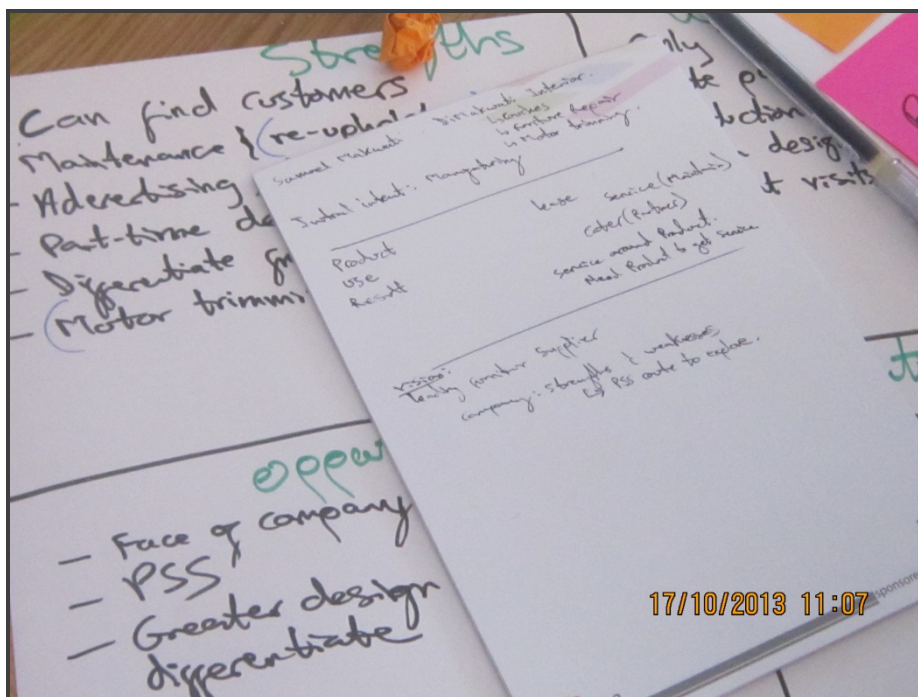
Figure 7-5: Activity 2 - Situational analysis (SWOT analysis for SME E)
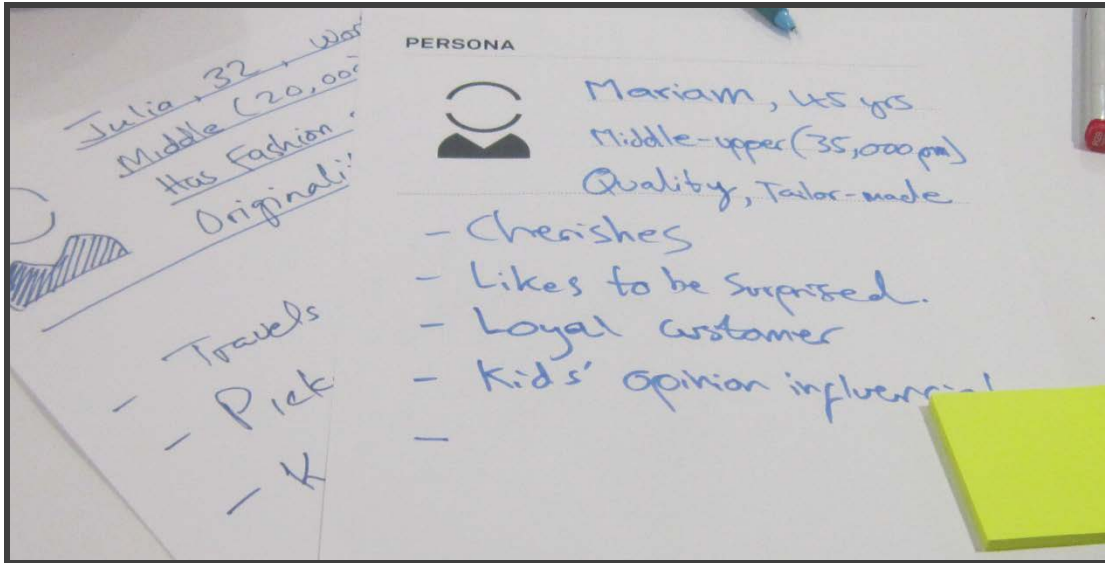
Figure 7-6: Activity 3 - Understanding customers to build customer journey maps (Personas for SME B)

7.4 Main Findings

The significance of themes developed during analysis was looked at under each workshop and then across workshops. The six themes emerged as a result of data analysis conducted in N-Vivo described in section 4.7.4.4. During analysis, the relationship between these themes showed a flow of issues across the themes in a linear fashion. Linear relationships demonstrated how themes built on each other into a sequential process from what drove SMEs to engage with designers (significance of prompts) to what they desired to achieve (perceived added advantage). In a reciprocal fashion, the relationship showed themes that have a bearing over each other through a cause-effect relationship. The evolution of these themes is discussed in the next subsections.

7.4.1 Description of themes

During the analysis of collaborative workshops between designers and SMEs, there emerged thematic areas as evidence of how a design-led approach can drive sustainable PSS adoption in micro enterprises. Six themes emerged out of the analysis (Table 7-1). These themes emerged as macro codes during N-Vivo analysis, describing codes with related issues which could be better presented by being grouped together. Evidence of this analysis process has been provided in Figure 4-

12. Under each theme, sub themes that arouse during analysis have also been used in italics to show the thread that connects it to the main theme.

Table 7-1: Main themes

Theme	Description
Significance of prompts	This theme embeds factors that motivated the company to embrace design and PSS as means of seeking added advantage. These factors drive SMEs to inquire about PSS and its business benefits
Building understanding	A description of how companies developed an understanding of how design and PSS fit into their businesses leading SMEs towards referring to examples they are used to
Reflections and familiar experiences	Clarification of SMEs' decision making and how they connected potential benefits of design and PSS to their projects and activities building confidence in SMEs to engage with design and PSS
Empowerment and coordination	An explanation of how SMEs were supported to develop PSS concepts and the effect of the process on their mind set towards design and PSS. This engagement gives SMEs a picture of their organisations as PSS providers
Organisational outlook	An emerging position of SMEs as a result of interactions with designers showing strategic issues pointing to requirements at organisational level needed for SMEs to create added advantage
Perceived added advantage	Various rewards that SMEs were looking to achieve, resembled in their outcomes from the workshops, directly related to factors that prompted them to inquire and engage with design and PSS

7.4.1.1 Significance of prompts

This theme embeds factors that motivated the company to embrace design and PSS as means of seeking added advantage. These factors drive SMEs to inquire about PSS and its business benefits

The first theme; significance of prompts, addresses issues that got companies interested to inquire about sustainable product service systems and benefits to their businesses. The need to make money, offer affordable offerings and recover manufacturing costs appear to be a major prompt for companies to look for new

173

and potentially beneficial strategies. Generally, SMEs work with limited finance; hence highly prioritise developments aimed at addressing their *financial commitments*. This has led them into looking at business niches that give them quick financial returns, often ignoring design as an important integral part of their businesses. SMEs saw the workshop as a turning point as far as quick financial gains and design were concerned.

> *"It was an eye opener in terms of our daily process that we have somehow neglected one major part which is the design part and have always been reproducing and overshadowing it in some way, running after making quick money".* SME B Product Development Manager: EV-INT

Quick financial gains are often explored in both Business to Business and Business to Customer markets. However this exploration is often limited as companies duplicate what others are doing, further reducing their chances of success in the *market*. This frustration caused by market failures led SMEs towards *open mindedness* during the workshops to break away from copying.

> *"I particularly saw great interest in moving away from always reproducing and looking into something that brings returns irrespective of whether we make it or not but putting a system in place. I saw them feeling the need to think of such and acknowledging PSS as a potentially beneficial possibility".* Designer B: EV-INT

Valuing design became apparent as SMEs appreciated how designers were able to probe issues of identifying user needs and addressing the issue of product ownership over ownerless. Personification of potential users with personas by designers showed SMEs different user needs and potential markets. This deficiency in how SMEs identified target markets was also picked up by designers who saw this as an opportune starting point of engagement with SMEs. This was further supported by the observation that what SMEs were doing could not be necessarily called designing but putting things together.

"Some of them design and manufacture their own products. Even though they do not really design but in terms of putting things together they do design and manufacture but in terms of investigating user needs we are not sure about that. I think if they were deciding they are going to implement that one, I think the designer would come in handy to explore further some of the issues around it".
Designer A: EV-INT

7.4.1.2 Building understanding

A description of how companies developed an understanding of how design and PSS fit into their businesses leading SMEs towards referring to examples they are used to

During the workshops *co-design* activities proved to be invaluable as SMEs interacted with designers, often changing their mind-set towards *willingness to break norms* in their business practices. Through discussions, question and answer moments, communicating with sketches and short notes on sticky notes during various activities in the workshop, SMEs began to recognise how design fits into their businesses and help them explore new opportunities as PSS providers. Here, the capability of design in exploring possibilities played a crucial role.

"It has be beneficial [the workshop] because I never had an idea that a shoe can be rented. That is why I was very sceptical about the idea in the beginning. But as the idea was explored I realised I can benefit". SME I: EV-INT

In order to support this process of understanding, designers drew inspirations from successful products in the local market. These inspirations were often used to communicate the impact of affordable offerings and ways of building a platform to provide them. The car industry was used as an example by designers. Examples were often expanded by SMEs as they demonstrated their understanding and buying-in attitude.

"People who could not afford to buy them [cars from local dealerships] were provided with a platform to now feel close to that. This is what happened with these cars that people say are not original. People couldn't afford what XX [a

175

prominent businessman running the biggest motor vehicle dealerships in the country] was selling. If you look at it, at least every household has a car now. Local dealerships were selling cars that not everybody could afford but then these cars came". Designer B: SME B-ACT III

The understanding developed by SMEs presented PSS to them as an opportunity to explore new markets where a product/service mix could be valuable. This further emphasised the issue of contextualising offerings, especially where cultural perceptions of superiority and inferiority of value are dominant in customers' purchasing decisions. There was a general feeling that customers often perceived locally produced goods as inferior in quality due to being used to well-established labels from outside the country. Although a leap to PSS was recognised as a big step for the companies, the possibility that value could be co-created with customers and availed in various forms made PSS an appealing option for SMEs.

"I think for the companies it is a big step. It's definitely possible if they want to grow in that direction. I think it's something they can implement. I wouldn't say it's resource intensive. It's really offering their customers different options and it's quite in line with they are doing now". Designer A: EV-INT

7.4.1.3 Reflections and familiar experiences

Clarification of SMEs' decision making and how they connected potential benefits of design and PSS to their projects and activities building confidence in SMEs to engage with design and PSS

Designers built an enhanced ability in SMEs to make better decisions by improving their confidence levels. Here the process of assimilation of knowledge appeared to be useful. There was a lot of design leadership offered by designers for group tasks and discussions to go on. SMEs tended to hold back and demonstrated low confidence levels in their thinking. Designers were able to drive them forward, especially when inspiring examples were experiences they could relate to.

"The rental issue of a PSS seems to be what comes to mind immediately when you talk about PSS. It is something they can easily relate to because they do it on a day

176

to day basis with other stuff like housing and things like that; Adima/Hire [an equipment renting company] etc. So when you start talking about PSS that's what they think about but when you start talking about other services they struggle to relate to them". Designer A: EV-INT

Through assimilation of experiences they began to see the other side of the bar. This led to SMEs taking initiatives to lead some tasks, further demonstrating passion in their businesses. The new design language to SMEs appeared to be a challenge to their level of confidence, especially when they had to make reference to visuals and other non-verbal forms of design communication like sketching.

Developing personas in co-design sessions boosted SMEs confidence as they saw it as an opportunity to reflect on their customers. SMEs strongly wanted characters resembling various personalities they deal with in their markets and potential personalities in markets they would like to explore. Based on experiences with their customers, SMEs then controlled brainstorming sessions by eliminating and rejecting some ideas. However, with design persuasion demonstrating potential in ideas, SMEs began to change their position.

A major contribution to this enhanced decision making capability was a guided process with interim evaluations between tasks. During these evaluation briefings, the group would collectively decide to revisit a decision or move on. At this point SMEs would reflect on problems in their businesses as they begin to see value in developmental possibilities through a design-led approach.

"The problem is we have just been concentrating on one area of the business, that is revenue generation and have been neglecting design" SME B Product Development Manager: ACT IV

Reflections resulting from interactions with designers led SMEs to revisiting their business intents. In some cases companies who were set up envisioning themselves as design icons found themselves caught in the maize of income generation. The need to revisit SMEs business intents was also observed by designers; should the

companies decide to operate as PSS providers.

> *"Sometimes when we looked at the products we realised they might have to redesign or design a new product specifically to address a certain service or to enable a certain service to take place".* Designer A: EV-INT

The biggest hurdle to jump over for SMEs as far as PSS is concerned was customers' decisions to own or not to own products. To the companies, this appeared to be tied to the social status value that comes with using a product known to be yours. To designers, the perspective was association with products known for a certain price tag, but offered through reasonable schemes. The possibility of this arrangement expanding buying choices for customers was received with cheer by SMEs though challenges still well acknowledged.

7.4.1.4 Empowerment and coordination

An explanation of how SMEs were supported to develop PSS concepts and the effect of the process on their mind set towards design and PSS. This engagement gives SMEs a picture of their organisations as PSS providers

Here design offered support to SMEs in the form of synchronised processes and use of tools. An enabling environment was created by designers' supportive mentorship behaviour. To cultivate SME buy in, designers demonstrated high degree of negotiation. Though this may be viewed as an interpersonal skill that may occur naturally, designers persuasively used it from the point of view of user-centred design, avoiding arguments with SMEs and driving them to seeing benefits of sustainability and PSS in their businesses. In the process of negotiating designers became emphatic with SMEs, enhancing their understanding of SME's point of view, helping them suggest alternative solutions. The inclusive term 'we' that designers consistently used throughout the group discussions, made SMEs feel that designers were part of the company.

There was a gradual shift in mind-set of SMEs towards sustainable PSS. This was a result of the persuasive ability of designers through an educative mentorship

approach with a lot of hands-on demonstrations of design capabilities through an iterative process characterised by recording of thoughts, exploring possibilities, use of various communication media from sketches, post-it notes, low fidelity prototypes, verbal and use of online sources. SMEs began to develop a new way of looking at their businesses won by designers' emphatic approach and using their products to sell sustainability and product service systems.

> *"We have been doing things without thinking about how they can be explored in various ways and how the final version might look like. From the designers I've learnt that they give themselves time to explore an idea and propose a way forward to demonstrate whether the idea will be beneficial. Then they put it on paper and explore whether this idea can work. If it doesn't work they go back to the drawing board and come up with other alternatives until a workable solution is reached".* SME I co-owner: EV-INT

The transition between tasks and arriving at decisions was heavily characterised by continuous analysis. This analytical process involved the use of visuals, mapping of processes and players and allocation of resources. This appeared to be a new process for SMEs who often appeared lost on the way. This analysis process also involved a lot of comprehension seeking approaches like question and answer from designers to SMEs to ensure that they captured SMEs' business interests and values. Through the assimilative learning of new knowledge, SMEs were able to catch-up as things they are familiar with were being mentioned.

Analysis demonstrated an interesting dimension of reconciling conflicting views. While SMEs often advanced product-oriented views, designers' came from a people oriented perspective. For example in SME E one of the arguments why the company was reluctant in providing purchasing alternatives like short term use of furniture as based on durability that leather will take time to wear off. The important contribution by designers was on customers being bored by the same product for too long. To change the SME's point of view, designers engaged SME on a question and answer session about materials and what is possible with them. The discussion led to a people focused transition where now user preferences result in a modular

design, which SME subscribed to. Reflections on the designers analytic approach gave PSS more value when the company compared it to the way they have been offering services like repair, which in the case of SME B were not undertaken as profit generating services but offered out of courtesy as part of customer retention.

7.4.1.5 Organisational outlook

An emerging position of SMEs as a result of interactions with designers showing strategic issues pointing to requirements at organisational level needed for SMEs to create added advantage

As companies built understanding and appreciated design capabilities in terms of looking at themselves as PSS providers, design assumed a strategic role. SMEs redefined what they called a 'designer', comparing experiences they got from industrial designers during the workshops to what they were used to. These reflections about designers also extended to knowledge of material selection, knowledge of the market, identifying user needs as well as the value of involving users throughout the process. Instead of a traditional focus in a manufacturing company on product improvement, SMEs now looked at other aspects having a bearing on their business activities. Visions of the companies began to emerge in future contexts of companies as PSS providers.

It appears throughout the sessions designers put more emphasis on uniqueness. This ultimately made SMEs realise that their income generation approach limited them in doing anything unique from their competitors. Generally there appear to be fear among SMEs to go the uniqueness route since their process starts with following what product sells in the market rather than establishing what people need. Designers link the need to be creative to company visions in a very interesting way.

> "*I was just looking at your vision that you aspire to be a leading manufacturer. The word that comes to mind is iconic, so that when people think of a bag they think of [SME B]. Certain things need to be done to make that brand iconic. To be a leading brand you are also talking of creativity and developing the right message to*

the consumers, and the ability to reach the right consumer at the right time".
Designer A: SME B-ACT II

This issue of building brand equity emerged as key for all SMEs who participated during the workshops; should they be successful as PSS providers. From the designers' point of view, brand equity was an essential dimension since relationships with customers and other stakeholders will expose their product/service mixes to people over a period of time. This needed building a brand to be known for pleasurable experiences by users, improving the value of the company as a PSS provider. A process of redefining offerings for SMEs and their customers was deemed essential. In all the cases of shoe, furniture and bag manufacturers, the products were redefined.

> *"There's different ways of looking at it. One can be as a utility, something you wear to keep you away from thorns. But you may wear a shoe as an image thing looking at what you are wearing".* Designer A: SME I: ACT II

Through use of customer journey maps to define user experiences, SMEs came to realise that customers were looking for more than just a product but satisfaction that it provided. In some cases, SMEs then realised the detriment of not making their own products to their sales and reputation. The need to build a positive perception of SMEs as PSS providers meant that stakeholders needed to be educated about PSS. There was recognition that customers, both individual and business, should be brought on board. SMEs needed a clear definition of how companies will work with stakeholders to build feasible business offerings.

> *"That's the biggest challenge; to make them aware that these services [PSS offerings] can be purchased and exist even is this industry. So our main role is to see that it happens especially for [SME B], something that we can package well to suit us and the kind of clientele that we have".* SME B: ACT IV

Involving stakeholders seemed to be a challenge for SMEs since it was a new introduction to their business transactions. Identifying the right stakeholders and

181

their value they add to the company would be a crucial first step. The difficulty in working with people who are not part of the company was a challenging experience for SMEs.

> *"The biggest challenge was that the companies give an impression that they are used to working by themselves and the idea of stakeholders was really new to them and that was perhaps one of the limiting factors in terms of coming up with more refined PSS. They are used to buying this from such and such a supplier and making it themselves. They don't really see a system where somebody is playing a role to design or sell something for them who is not part of their company. I think from their point of view the idea of stakeholders is really not something they are used to".* Designer A: EV-INT

7.4.1.6 Perceived added advantage

Various rewards that SMEs were looking to achieve, resembled in their outcomes from the workshops, directly related to factors that prompted them to inquire and engage with design and PSS

It appears SMEs have never worked on written agreements before. Informal agreements that were never honoured made SMEs sceptical about business dealings involving trading through agreements. As understanding increase opportunities arise in various markets and product lines where trading through agreements can work. This applies to experiences where SMEs have observed for example inappropriate use of products in some events.

> *"You might find that fashion bags are rented for a short period of time, say over night and brought in the next morning. Having been in the industry for some time, I've seen a lot of people with inappropriate bags for some events. One would be at a cocktail party with an inappropriate bag. I've seen that a lot in the city".* SME B Marketing Manager: ACT-III

7.4.1.6.1 Customer retention

As a customer retention strategy, SMEs sought to use PSS to consolidate relationships with existing customers in both B2B and B2C markets. This advantage

was seen as a good starting point by all SMEs. For the furniture manufacturer for example, B2B customers who had been supplied before and had come back for maintenance work were the first target. For the bag manufacturer, emphasis was on serving busy female customers who always wanted to look different on a new bag.

7.4.1.6.2 Differentiation avenues

Although it emerged in most cases that SMEs needed a new product through which to tell their story, a variety of differentiation options were not in the form of physical products. Differentiation was more explored as services supporting a redesign of an existing product or a new product introduced to facilitate certain services. Design mainly contributed in developing these outcomes based on benefits in a life cycle approach. This was based on customer journey maps developed during the workshops, often showing benefits to customers and other stakeholders.

> *"We can also look at the product life cycle. As much as the user will be using the product they also need to take care of the product until end of life. So looking at the entire process and trying to derive services from there will be another way of looking at it".* Designer A: SME A-ACT II

Most ideas were more of product oriented PSS based on already existing services which companies were either offering at a non-commercial level or were not doing it successfully. Failures associated with existing services were often a result of lack of a defined strategy outlining benefits to customers and to the business. This led businesses to stop offering these services or customers seeking them elsewhere. Use oriented PSS led to SMEs identifying new markets. A popular idea which SMEs explored further was renting their products. Although this could not automatically be achieved with every product, it was possible to explore specific company products where it could work. In exceptional cases, results oriented PSS appeared possible. A logistics oriented PSS by a shoe manufacturer looking for improving access to the market demonstrated this type of PSS.

7.4.1.6.3 Resource efficiency

Maximising resource usage became an exciting idea for resource constrained SMEs. The renting aspect of a PSS seemed financially beneficial in producing less items and rotating them in use. For product lines heavily characterised by seasonal sales and in some cases less frequent uses like shoes, a pay per use became more appealing. To the furniture manufacturer, a customisable furniture propositions meant modular designs allowing part changeability; where old and proper working parts can be used together with new ones. To the bag manufacturer, it was more of making their products more accessible to people who cannot afford owning expensive leather bags. Benefits of PSS were often seen as aiding increased profits with fewer resources.

"For one product we will make a profit of 10 products or more, because customers will be paying for the service. They will be paying for using the product temporarily and they bring it back. It will open up new markets. It will require us to use less material because where we could have sold 10 bags we rent out 10 bags". SME B Marketing Manager: ACT IV

7.4.1.6.4 Environmental responsibility

An interesting and rarely expected outcome that SMEs saw possible was selling their businesses as environmentally responsible. All SMEs favoured a voluntary product take back strategy to support environmental responsibility. The main driver for doing so however was financial in terms of recovering products to give them a second generation of life and materials for secondary uses. At the same time SMEs saw a take back approach to be promoting their businesses as environmentally responsible. Simply put, SMEs saw PSS in light of promoting material recycling in their businesses. Their knowledge of materials even came in handy when they alluded that old leather could be more valuable than virgin material as leather tended to get more appealing with time during use.

"If we go back to the rent a bag idea, where you take back a bag and be given another one; that's recycling. Even the leather from the returned product might be more valuable than when it was still new". SME B Marketing Manager: ACT IV

184

7.4.2   Reflections on themes

A linear relationship was identified between themes which link themes with a rollover effect onto the next one. This relationship reflected the development process which can mirrored to the innovation process. The importance of issues identified as those prompting SMEs to engage with design and PSS drove them to begin an inquiry of how they could benefit from PSS. The early recognised value of design in the process triggered this interest to build understanding. This process of building understanding relied on non-conventional approaches in terms of what SMEs were used to, calling for more examples in their context such that they could easily relate. At this point designers brought in more explorations and ideation through the iterative design approach until the SMEs were able to see their businesses from various perspectives in terms of what the companies will require as PSS providers (organisational outlook). This picture allows SMEs to move forward and develop a proposition.

An interesting reciprocal relationship is that between the proposition and what SMEs initially sought to achieve, which was key in their evaluation of whether sustainable PSS was a viable alternative. Other reciprocal relationships provided understanding of which themes influenced others. An example is building understanding and empowerment and coordination. When designers engaged SMEs with tools, methods and process, SMEs' understanding was enhanced. This often led to the group revisiting previous tasks of their co-design activities for further improvements. A summary of these relationships has been provided in Figure 7-7. Figure 7-7 shows main themes and sub-themes as a result of N-Vivo coding and categorisation following the data analysis rationale provided in section 4.7.4.4. As an example of the causality between Figure 7-7 and Systems Success Framework in Figure 6-4, the Significance of prompts theme shows factors that ignited interest in SMEs to explore a design approach to address the Competiveness SSF. An open mind and financial commitments sub-themes are reflected under Competitiveness SSF. This is shown as SME business culture and infrastructural consideration to reduce complacency with small gains, respectively. The Building understanding theme mainly relate to infrastructural and institutional dimensions of Design,

Sustainability, Relationships and Business environment SSFs. The co-design sub-theme is reflected under the Design SSF as an institutional consideration to promote designers involvement in delivering support to SMEs.
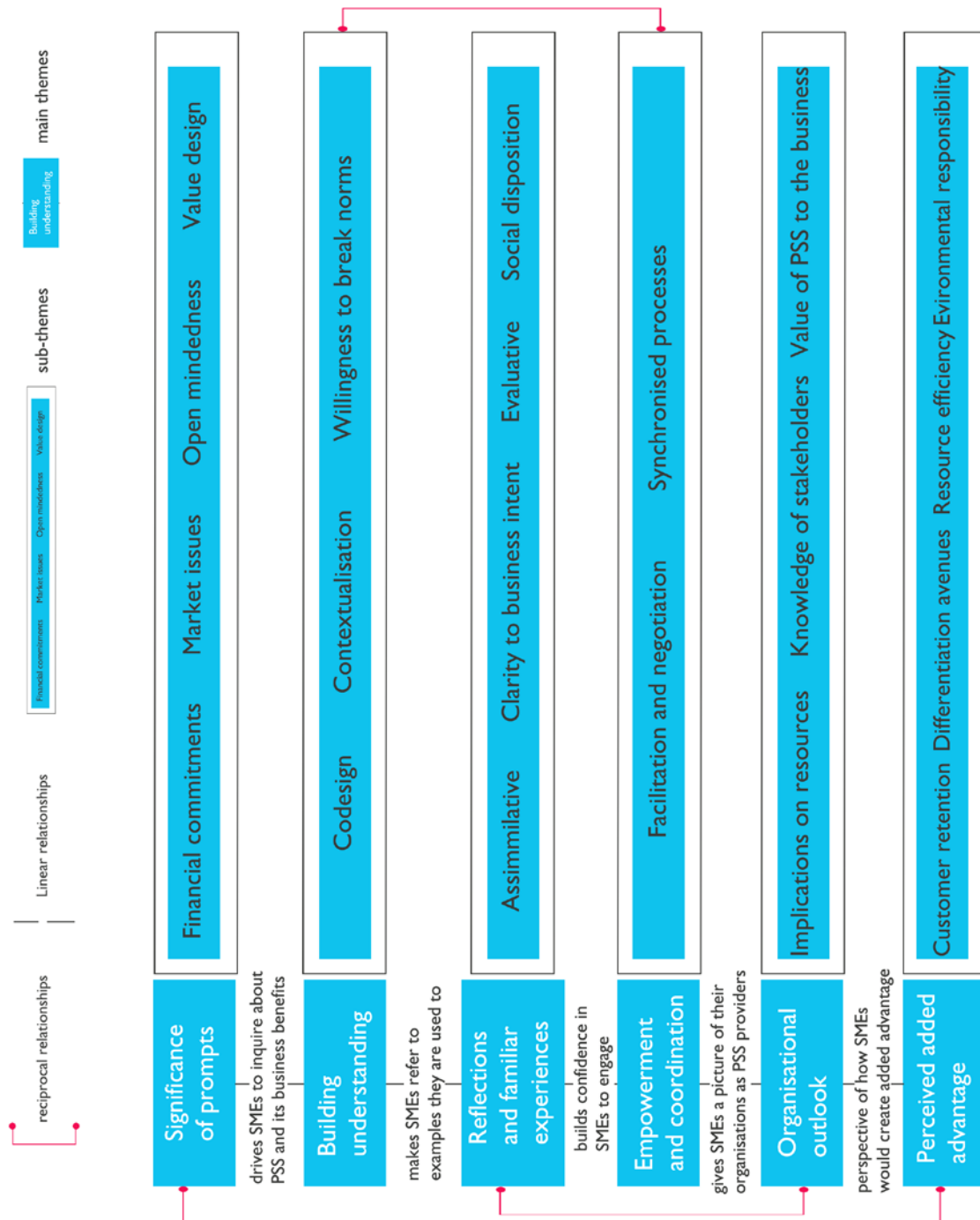
Figure 7-7: Summary of themes and relationships

8 Exploratory workshops

This chapter presents proceedings of interactive workshops conducted with 3 SMEs in the leather sector belonging to three different industries of shoe, bag and furniture, and industrial designers. A justification of this approach in the context of participant SMEs is described and key observations from each workshop are presented under themes identified during analysis. Conclusions from each workshop create room for comparison of these observations, making provision for drawing similarities and differences in outcomes of the interactive process between SMEs and designers.

8.1 1st Workshop: SME E – Furniture manufacturer

Company: SME E

Industry: Furniture
Year established: 2007
Highest qualification: Proficiency certificate in leather works
Number of employees: 2, including owner/manager
Main product: Office furniture
Main projects: Re-upholstery of old furniture
Main market: Business2Business
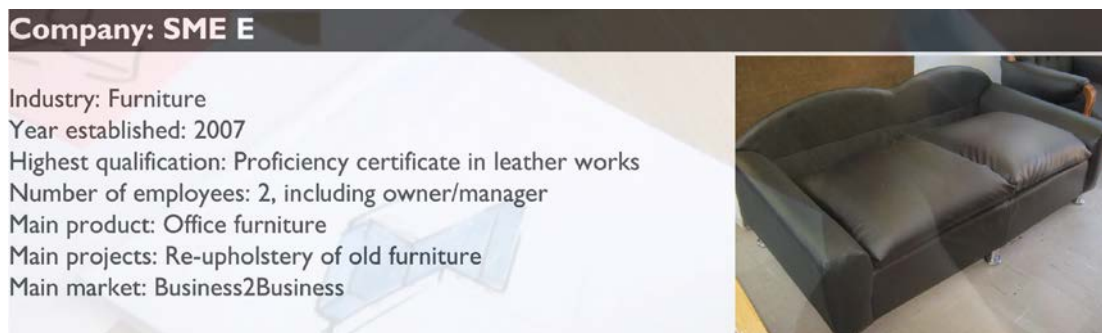
Figure 8-1: Summary of company profile

8.1.1 Introduction

SME E was originally set up by two individuals as a furniture repairing company operating from home. One of the co-founders had worked for furniture manufacturing companies in the country and had collected a vast wealth of experience. The other co-founder, who has since left the company to start his own, was a furniture design graduate from one of the local universities. The company's main business is re-upholstery of furniture with canvas and leather for organisations and government institutions (see sample products in Figure 8-2). Seasonal jobs in this type of business prompted the company to start manufacturing.

Figure 8-2: SME E sample products

Though viewed as the future of the company, the manufacturing side of the business is still surrounded by challenges. To this day, the company has not been able to launch a successful product in the market, except a few products for individual customers produced on request which are reproductions of existing designs. The owner attests this challenge to not having enough capacity to produce their own designs.

There is recognition in the company that they need designers for them to engage in such innovation activities. Although the owner/manager has been exposed to furniture manufacturing before, his roles were limited to working with ready-made templates. He has never worked with a design team before, especially to experience vital stages like investigating user needs and exploring concept solutions. Further constraints include the low technology that the company uses. The small and congested workshop space (Figure 8-3) is still set up in a traditional way, heavily relying on hand tools and few manually operated machinery.

Figure 8-3: Sawdust box collectors, machinery and hand tools in SME E workshop

In their re-upholstery business, the company employs external services of a carpenter, who in some instances during contact with the company had been mistakenly called a designer. The main role of the carpenter is to repair timber structures for furniture before covered with new upholstery. Key capabilities that the carpenter has been commended for include reading technical drawings, knowledge and skills of processes used for various timber manufacturing and repair techniques for timber.

8.1.2 Site visits and consultations

Prior to the workshop, two visits were made to the company to understand and discuss the company's vision in terms of how the company intends carrying it forward into the future. The first visit was mainly to see the company's resources and initiate dialogue about their vision since they did not have anything readily documented. The company was given a week before the next meeting. An agreeable vision statement was arrived at during the meeting portraying the company as a

supplier of furniture for B2B and B2C markets. Outcomes of these two meetings are summarised in Table 8-1.

Table 8-1: SME E basic resources and vision

Company's basic resources	2 employees including the owner/manager Hand tools 2 pillar drills A work bench A disk sander Power tools A multi-purpose workshop with shared machinery across other SMEs.
Company's vision	To be a leading supplier of furniture for business and individual customers in Botswana

8.1.3   Proceedings of the workshop

After the workshop protocol (see appendix D) was piloted (see section 7.3.1), the half day workshop resumed on the set date. At the beginning of the workshop it was important to build group dynamics between SME participants and designers. In the group building activity SME participants remained puzzled, needing a lot of encouragement from both designers and the facilitator. Throughout the workshop designers played a leadership role, displaying a lot of empathy to see things from the SME's perspective. The empathic approach led to SME opening up, mostly providing information about the company and sharing their business experiences. The outcome-based activities of the workshop provided direction and clarity for the workshop objective, showing the impact design has in the company's problem solving approach and how it can integrate PSS into its business (Table 8-2).

Table 8-2: SME E activities and outcomes

Activity	Outcomes
1. **Team building (Lost in the desert island)**	Various products brought together for survival encouraging and expanding SME's perspective about problem solving and ideation
2. **Aligning company vision towards a PSS focus**	A defined SWOT analysis for the company Assessed company's current work model Possible solutions to align company vision to a PSS business approach Defined possible PSS strategies and how they can be implemented Defined PSS model at 3 levels - Strategy - Concept - Implementation
3. **Building customer experiences and prototyping**	Product oriented PSS mainly with couches - A new line of customisable furniture called M-Line Use oriented PSS mainly with kists - A new line of furniture for rent comprised of a combination of furniture called Slim-Line
4. **A business pitch**	New business avenues Sustainable business operation with services to make money Clear definition of how SME will work with stakeholders to build feasible business offerings

8.1.4 Reflections on workshop proceedings

Activity outcomes formed the basis of sense making of workshop results. From the outcomes two underlying concepts of how design can impact the company and how the company can benefit from PSS were extracted. Further insights from reflections during evaluation interviews by both designers and the owner/manager showed that the company did not know what design is and its value to the company before the workshop. The key difference noticed by the SME between their carpenter and

industrial designers at the workshop was the designers' ability to think differently and come up with something new. These differences mainly concerned user involvement in their processes and identifying target market.

Though designers saw personas to be limited compared to using real people, to the furniture manufacturer personas became the basis of the decision to favour a PSS approach for stools and couches. These would be targeted at middle class customers who mainly live in cities and major towns. The decision to develop a use-oriented PSS with stools was also cost related. The limited company resources meant only a certain number can be produced in a month and distributed to users. The re-upholstery business for Business to Business (B2B) customers would be maintained with proper agreements to keep existing customers. This would allow expansion of the use-oriented PSS to these organisations as the company develops its own modular and customisable furniture for rental during re-upholstery of the customers' furniture.

 For designers, the SME's open mind about PSS was a good starting point. Though mentioning the need for a new design was not a welcome idea at the beginning, the designers emphasised the SME's openness to explore the idea. There was a feeling among designers that bringing their work to the workshop would have been a big inspiration and a confidence stilling approach in SME. This was viewed relevant in incidents where designers felt something new was needed instead of modifications to the existing.

8.1.5 Key observations from the workshop

8.1.5.1 Significance of prompts

Design appealed to the SME owner with its capability to explore possibilities. When the company shared its vision with designers, they immediately broke it down in short notes form on sticky notes. The SME provided mostly problems about the company to designers. One of the opportunities identified was a greater design input to differentiate since there were new companies offering the same re-upholstery services, which is the company's main business. The SME got excited by

192

this thinking. The value of design as a means to differentiate was viewed by the company as an opportunity to keep their business customers and open new Business to Customer (B2C) markets.

When the group of designers and SME participants developed personas (Figure 8-4) during the workshop, the SME owner echoed the importance of involving users early in the process and immediately linked personas to their various customers. Personas prompted SME to engage with designers to explore how he could serve a growing market of repair according to his observation.
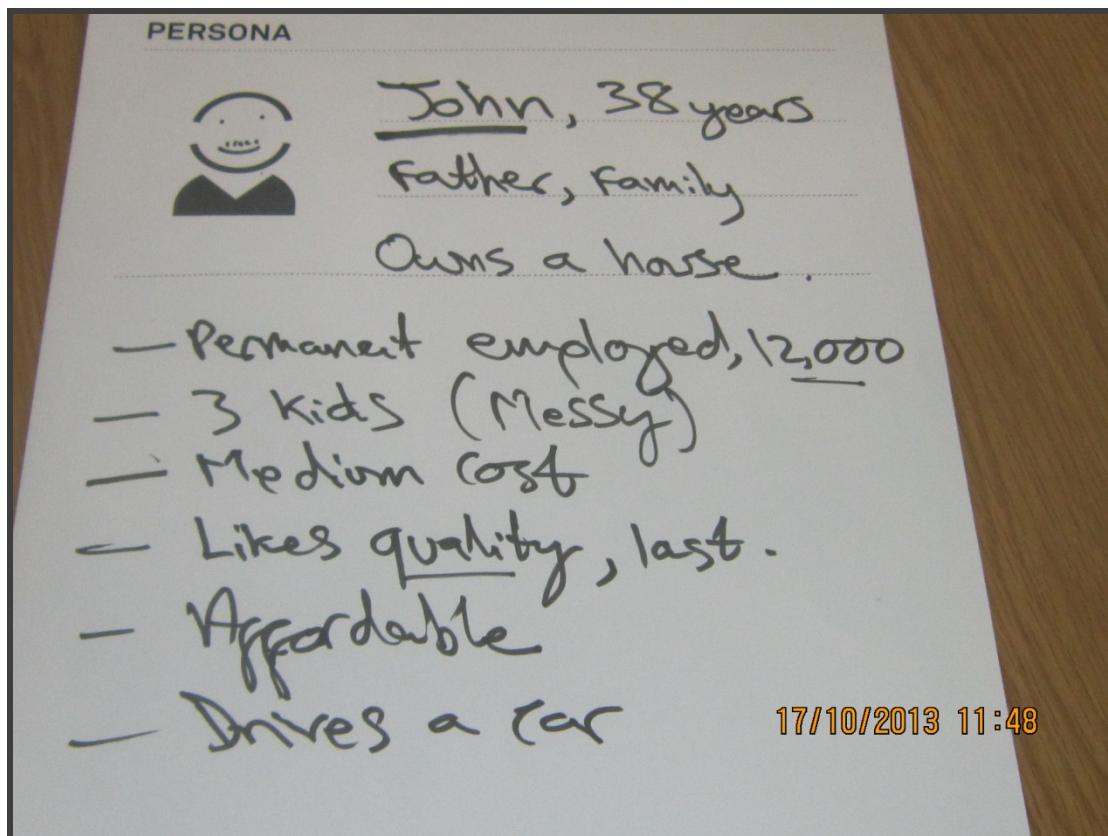
Figure 8-4: Sample persona developed with SME E

8.1.5.2 Building understanding

Interpreting the company's vision through a series of activities with outcomes enhanced SME participants' understanding of PSS and benefits to their company. A co-design approach seemed to be more engaging, informative and worthwhile when interactions were beyond conversations.

When the group explored an idea about customisable furniture the owner was turned around. Designers had put down a basic sketch to form the basis of their discussion (Figure 8-5). This allowed SME to direct his feasibility related comments to designers making reference to the sketch. To this SME, customisable furniture explained the concept of sustainability and PSS. Making reference to personas further depicting user involvement, the group used a situation of customers who wanted a different feel after some time. While the SME's initial resistance was on material durability, designers' perspective was from customers being bored by the same product for too long.
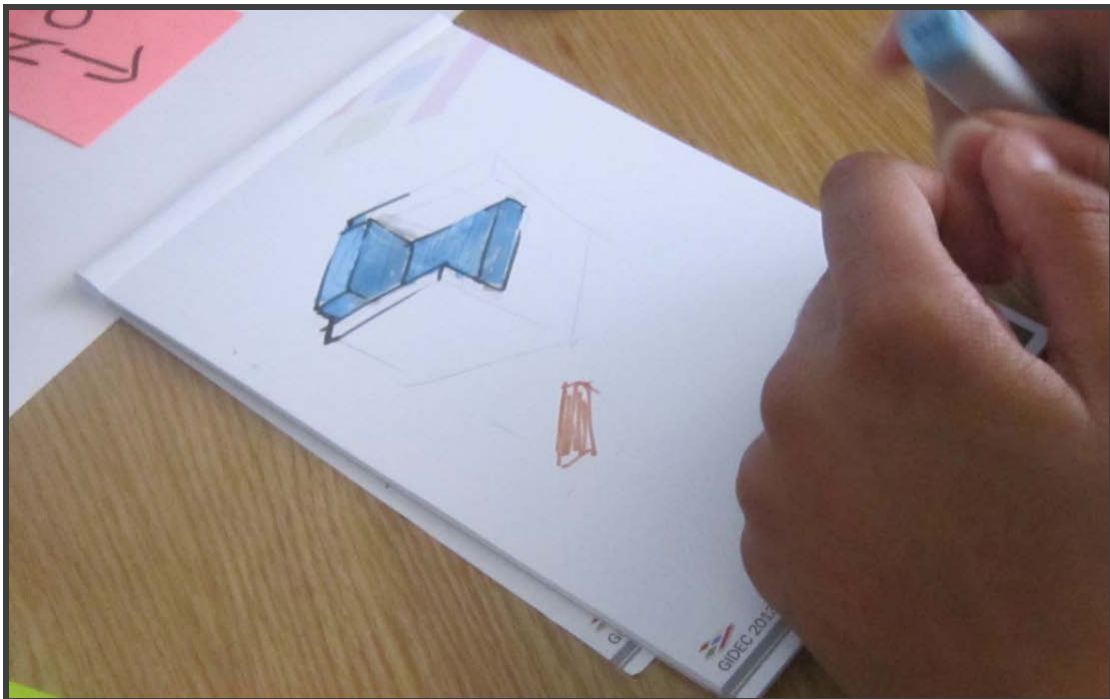
Figure 8-5: Sample sketch to explore customisable sofa idea

The SME's interest in designers' point of view led him to suggesting colours which are popular in their market and further explained that they use old material as underlays to protect new upholstery on the surface. The modular design of the couch concept to change separate parts for upgradability and style demonstrated value of product take back to SME. Providing this service to furniture owned by customers explained a product-oriented PSS to SME participants. An understanding of a need for a new design of furniture also emerged. At this point the SME was willing to break their norm of copying existing designs.

8.1.5.3 Reflections and familiar experiences

The owner made some reflections concerning experiences he got from designers and people he had been working with. A very significant one was when he noticed designers came up with ideas/designs while the gentleman he had been calling a designer was actually not but a carpenter. Grasping the concept of service component for a furniture manufacturer was supported by his previous experiences of re-upholstery and maintenance. The company had been doing these as the main jobs for the business. Designers used these experiences on the basis of building SME's perspective of consciously designing service experiences supported by suitable products.

As the SME's understanding broadened, he began to make relationships between successful products and personas they developed to describe potential customers. However, this was related to an existing couch and the type of customers buying it. This ability to reflect was supported throughout the workshop by brief evaluations between tasks. Designers used this train of thought by SME to win his buy-in. his experiences gave way for ideas by designers. The owner's observation on his customers about colour led to a further development on the customisable idea on the basis of different colours. Since the company was already doing refurbishment of old furniture they found the transfer of this experience to a new platform worthwhile. These propositions further empowered designers to draw the company back to its intent of supplying furniture.

8.1.5.4 Empowerment and coordination

SME participants accepted the experimentation approach adopted by designers. Designers then assigned SME participants tasks including noting ideas down and presenting activity outcomes to the whole group. A process and methodology to keep SME participants on track was offered by designers. Exploration of the problem space was done through understanding the company's vision leading to definition of the market and the emphasis on the need for the company to differentiate their furniture offerings. The context broadened to the need to build

relationships with furniture selling outlets to supply their unique offerings. Defining the problem space early allowed identification of new opportunities in two ways;

- A product-oriented PSS for Business to Customer (B2C) market with customisable furniture to be maintained by the company once it has been bought by their customers (based on personas and outlined in Figure 8-6).

- A use oriented PSS for Business to Business (B2B) market involving partnerships with catering companies (vendors), providing them with furniture for short sitting-ins.
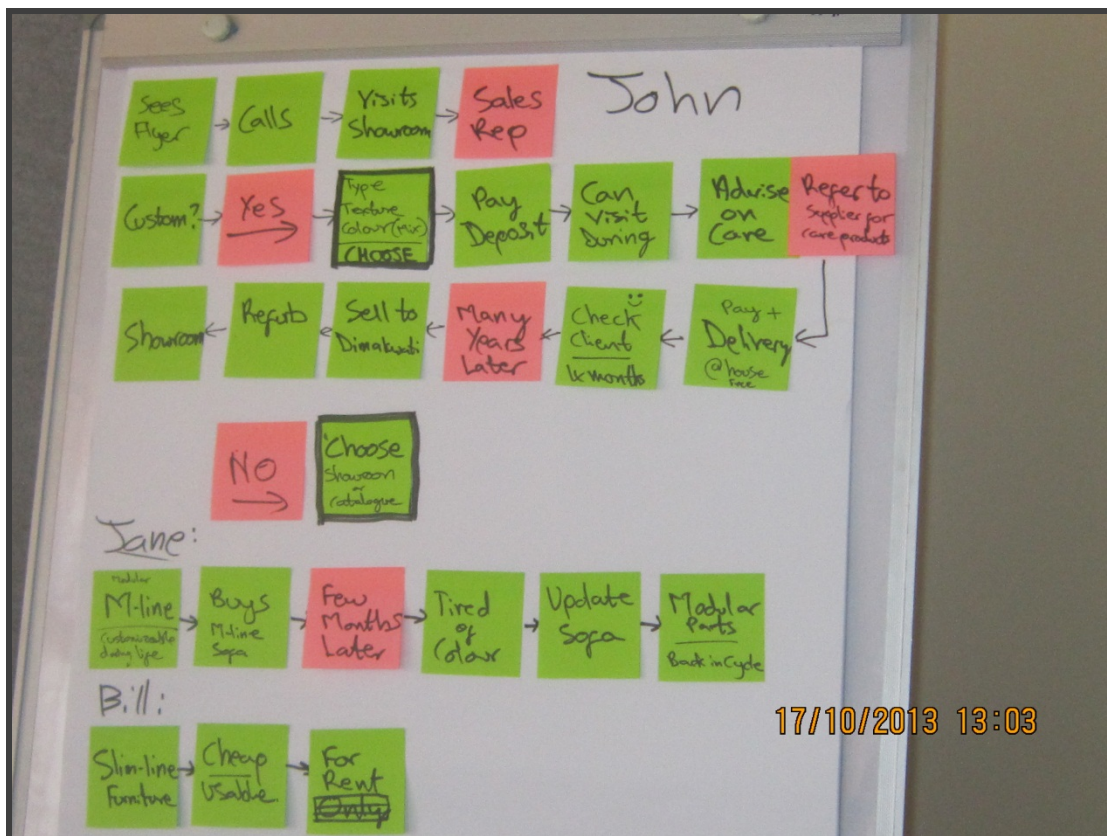
Figure 8-6: SME E customer journey low fidelity prototypes

The defined problem space was worked through iterations and feedback, often providing more explanations for SME participants. The use of tools by designers like personas, customer journey maps and sketching were a new introduction to SME participants. Through personas SME participants were able to tie various customers to various PSS propositions. Design exploration proved useful as the group looked at possibilities. The persuasion of visualisation through sketching and use of quick

196

sticky notes gave SME participants a clue about the space between concept and product while at the same time considering what was economic to do. This process was easily driven by the less resistance SME participants had.

8.1.5.5 Organisational outlook

The group concluded that consolidating re-upholstery and repair for B2B markets can support SME resource optimisation. Since there already were existing customers for re-upholstery and repair, the company wanted to work with designers on a new couch for renting out to these business customers. This would allow the company to rent out the products to customers who had brought their products for repair, introducing this new offering to them at the same time. The owner pointed out key stakeholders like their carpenter, designers, suppliers and customers and the need to establish a common working ground. All stakeholders would need to be supported through educative initiatives about PSS for them to see value in consuming services rather than material products.

The company saw value in PSS especially when designers pointed out limitations with their existing products. The main weakness was that these were copied products and would not offer anything unique to customers. The need to design new products; a new sofa; a new kist; a new stool, specifically for a particular need to be satisfied through a PSS was embraced. This would help the company build brand equity through its ability to differentiate and design their line of furniture. Emphasis from designers was the company to come up with unique furniture to make the concept of PSS appeal to customers. Designers' evaluation was that the focus was on future scenarios. At the same time there was consensus that implications on company resources may not be costly as there was almost nothing to retrofit.

8.1.5.6 Perceived added advantages

Emphasis on designs for PSS gave the company's dream to launch their own product a new definition. To retain their existing B2B customers and expand their repair, re-upholstery and maintenance business the company would offer a use oriented PSS in exchange for products brought for repair/re-upholstery.

Strategic additions to the company's resource efficiency include modularity of furniture allowing customisability and product take back. This was a welcome approach for the owner in light of cost of raw materials as it demonstrated value in material recovery. The customisable furniture idea involved customisation during use not at the point of sale. The owner subscribed to the idea of old-looking furniture adding that leather became more appealing as it aged. The other line, S-Line furniture, will be made out of parts to facilitate reuse and recycling. The company's interest in these product service systems are in minimising material costs and growing their market.

> *"If you look at the Slim-Line, everything else will be reused and recycled. The core of the furniture which is basically the structure stays and is maintained. The leather parts will be re-used or used to make other parts for the same product or contribute in making a newer design".* Designer B: SME A-ACT IV

8.1.6   Conclusions

At the time of evaluation interviews, much of the reflections made by the company were about securing contracts for their business customers. However during the workshop the company had opened up to design aiding them launching a product of their own. This was the first exposure of the company to design and designers. The owner's tolerance to designers made the concepts of sustainability and PSS a profitable revelation for the company. This was also facilitated by re-upholstery and furniture repair that the company had been doing.

Re-upholstery and repair have over the years been developed into capabilities through which the company was able to attract big organisations. Designers' propositions built on these capabilities, further offering complimentary capabilities from the design perspective like exploration and differentiation. The key design capability that excited the owner was design creativity. With this capability designers quickly demonstrated through sketching that they could come up with a product of their own, addressing needs of his market. Through design creativity, PSS

furniture lines were proposed since they were based on the company launching a product of their own: something they have never done before.

The often demanding knowledge required in PSS design proved to be a challenge for the SME participants who at some point remained passive as designers did almost everything. This was a limitation of his present capabilities limited to furniture construction without any other formal training other than on the job training in industry. The thinking capability required across a lot of issues like stakeholders, customer experiences and identifying user needs were all overwhelming for the owner. Designers approach to explain every little detail to the owner often brought him on board and enhanced their working relationship, further settling him about disclosing company information. Trust was a major concern for this SME since the owner had observed re-upholstery and repair businesses were increasing in town. Designers needed to guarantee it through their ability to negotiate.

The introduction of designers as new stakeholders was something the owner saw as an important addition to the company's carpentry capability. According to the owner, reconciliation of these two would be essential especially as he saw designers as offering creativity, methodology and uniqueness. The carpenter would need to be brought to speed with understanding design language to avoid conflicting philosophies especially when manufacturing decisions are made. In this case both design and carpentry would be used as dynamic capabilities to support innovation in the company.

8.2   2nd Workshop: SME I - Shoe manufacturer

Company: SME I

Industry: Footwear
Year established: 2006
Highest qualification: Proficiency certificate in leather works
Number of employees: 4, including owner/manager
Main product: School shoes
Main projects: Supplying local councils for orphan students
Main market: Government

Figure 8-7: Summary of company profile

8.2.1 Introduction

SME B evolved from a shoe repairing under-tree shades one man shop to a shoe manufacturer. The company's main business is in supply of school shoes to local councils. Local councils have orphans and needy students registered under their care and distribute these shoes to them. Since the company is not the sole supplier of school shoes in the country, they go through a tendering process to be awarded jobs to supply shoes. Financial implications for the tendering process result in the company submitting a maximum of three tender documents out of a possible nine. In addition to tendering issues, the company still fears it is not in a position to supply more than two councils, should it tender for more jobs and win them. Their main concern for this inadequacy is unreliable supply of materials, low production output and lack of skilled labour.

The company's dependency on tenders led them to diversify their market to safety shoes and ladies' summer shoes. However, challenges in these markets, especially competition from outlets selling well established shoe brands, still make school shoes market a viable option for the company. Sample products from the company are shown in Figure 8-8.

Figure 8-8: SME I sample products

Although the company has made a decision to diversify their market, there is little they are doing in terms of developing innovation capabilities in order for them to

sell competitively. During an interview conducted in the study preceding the workshop (see chapter 6 for details of the study), the owner/manager mentioned that the school shoes they were manufacturing mimicked established school shoes brands popular in the region like Toughies and Bata. This lack of innovation has also been transferred to the safety boots and ladies summer shoes product lines. The company purchases standard shoe moulds and uses them to produce basic and strictly functional products. Due to this less influence of design, the products have not been successful on the basis of aesthetics related comments from customers.

Negative feedback from customers led the company to look for inspiration online. Limited capabilities to interpret existing designs have aggravated the company's copying problem. The owner has since recognised the value design can have in his business. The major interest was in the capability to differentiate and produce shoes that appeal to users' needs.

8.2.2   Site visits and consultations

As in the first case, two visits were made to the company's premises prior the workshop. The visits were still under the same purpose of seeing the company's resources and understanding their vision. In this case their vision was more focused in penetrating the local retail market. The target for this vision is to penetrate the B2B market through supplying local shoe sellers and B2C ultimately with shoe retail outlets. As in the previous case this would provide a point of departure for designers at the workshop. A summary of the outcomes of the meetings is provided in Table 8-3.

Table 8-3: SME I basic resources and vision

Company's basic resources	4 employees including the owner/manager Hand tools 2 work benches Sewing machines Power tools A multi-purpose workshop with shared machinery across other SMEs.
Company's vision	To penetrate the shoe retail market in 5 years and be a reputable shoes manufacturer for local people to buy shoes locally

8.2.3 Proceedings of the workshop

The same protocol was followed as in the first case. At the beginning of the group building activity SME participants appeared to have been frozen. Later on, throughout the workshop the company was more open to exploring alternatives. Although the SME was open to the exploration process, they were often caught in waiting for the designers to suggest what to do, surrendering the company to designers. This occasionally tempted designers to run the show, leaving SME with less ownership over ideas being proposed. This behaviour hindered SME to interact with designers and participate actively. To give the company back, designers visualised information they got from SMEs and ideas during brainstorming and discussions and fed it back to them through directed question and answer discussions.

A shared responsibility approach was also adopted to give the SME some sense of ownership. The visual approach adopted by designers through sketches, short notes on sticky notes and tables proved helpful. SMEs kept referring to the visuals during discussions, enhancing their understanding of what appeared to be complex PSS concepts for them. By the end of the workshop the SME could confidently talk about their company in the proposed context, however still needing practice in trying out the ideas. The outcomes of the activities are summarised in Table 8-4.

Table 8-4: SME I activities and outcomes

Activity	Outcomes
1. Team building (Lost in the desert island)	Vastly varied products brought together for survival SME's ability and interest in exploring solutions
2. Aligning company vision towards a PSS focus	A defined SWOT analysis for the company Possible solutions to align company vision to a PSS business approach Defined possible PSS strategies and how they can be implemented Defined PSS model at 3 levels • Strategy • Concept • Implementation
3. Building customer experiences and prototyping	Product oriented PSS mainly • A shoe care PSS • A shoe repair PSS Use oriented PSS • An onsite safety shoes rental PSS
4. A business pitch	New business avenues Sustainable business operation with services to make money Clear definition of how SME will work with stakeholders to build feasible business offerings

8.2.4   Reflections on workshop proceedings

Throughout the outcome-based process the SME had an opportunity to challenge the value creation approach in their company and developed a new outlook for creating value. The outcomes of the activities provided clarity of the workshop results concerning the company's position in terms of design and PSS. The SME's open mind to explore possibilities gave designers an opportunity to excite them about exploring various solutions and a process to support reaching a proposition.

This approach proved instrumental for working on PSS concepts, which often called for thinking beyond the product. For example, a logistics PSS for primarily

supporting the company's vision was a cooperation with retailers. This drove the SME to start approaching some outlets immediately after the workshop.

8.2.5 Key observations from the case

8.2.5.1 Significance of prompts

The recognition by SME participants that they had not been doing design prompted them to engage with designers. The capability of design looking for new opportunities and exploring possibilities was recognised by SME participants and became the point of departure for their engagement with design and PSS.

> *"So we need some kind of partnership with distributing company. This means they carry the distribution cost but of course we will pay a little fee. Is this the end of the cycle? Are we attaching anything else to the service? What about services like cleaning? What about repair as part of this cycle?"* SME I co-owner: ACT II

The need for design exploration in the company was driven by market conditions. The company wanted to open new B2C markets with affordable offerings and reduce their dependency on tenders. They were therefore keen to give a shoe a new meaning beyond the utility of protecting one's feet as it was the case with their school shoes products. The company already had a profitable shoe repair service that they were keen to grow from their own shoe designs.

8.2.5.2 Building understanding

Co-design activities were mainly focusing on shoe repair and expanding the company vision.

> *"We were mainly focusing on shoe repair because I had told them shoe repair is currently giving me business. We were exploring how we can craft a shoe design for repair that we can sell as our own product".* SME B co-owner: EV-INT

SWOT analysis was used to guide SME's focus to specific topical areas (Figure 8-9). Designers extracted information they deemed useful from SME, although in some

cases they assumed a dominant role of doing everything leaving SME participants watching. This behaviour was often observed when the SME resisted something was not possible. This was the case when concepts not very common like shoe leasing were proposed by designers. Exploration with sticky notes and online resources by designers led to a shoe care idea which sat well with SME participants.
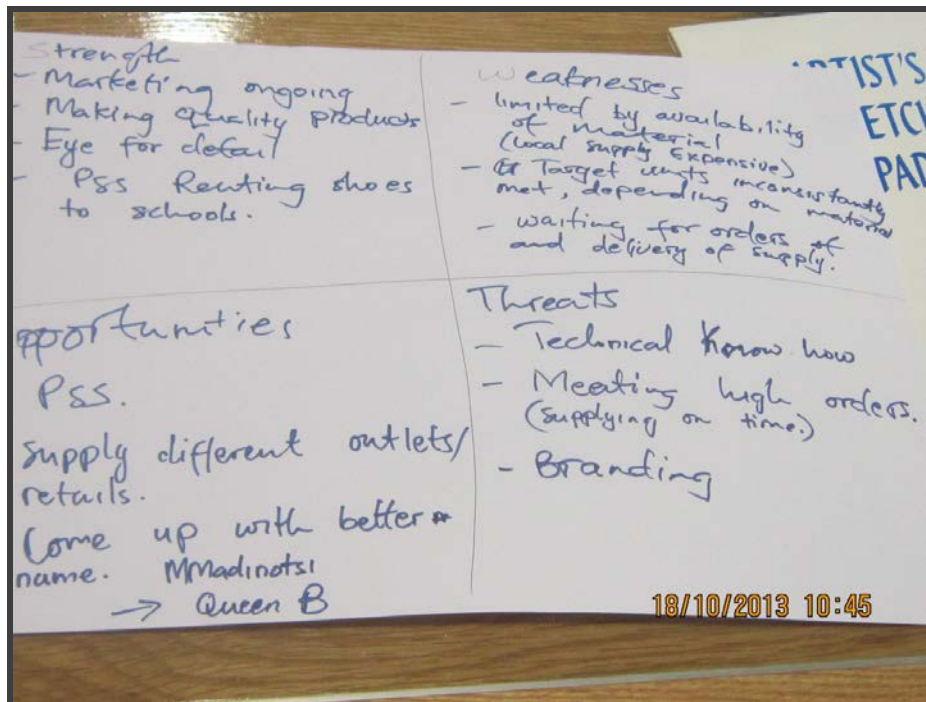
Figure 8-9: SME I situational analysis

Benefits of shoe care seemed to be broader than just repair and gave birth to a shoe distribution PSS which aided SME see PSS beyond just renting. Two major issues formed SME's understanding;

- A distribution PSS would help forge relationships with shoe-selling stores to penetrate retail market. This understanding was reflected in SME's follow-up actions after the workshop.

"After we talked about it, last week I asked LEA personnel and went around boutiques. They now want to see samples of our products that can sell in boutiques. Next week we are working on the samples that we can take with us to the boutiques. We might strike an agreement somehow. We visited 4 boutiques and they all requested to see out samples". SME B co-owner: EV-INT

- A shoe care PSS would redefine a shoe beyond its utility of protecting feet to providing convenience in the case of safety shoe renting for students in institutions of higher learning where use is often occasional and for a short period of time.

8.2.5.3 Reflections and familiar experiences

In a very broad way, the owner's reflections about the workshop were a comparison between what they would usually do and what they did with the designers.

> *"The workshop was informative. It enlightened me in things that I have been doing, thinking I am doing them right while I was not. Other issues that we talked about, there are a few things I have tried to follow to see if my business cannot benefit".* SME B co-owner: EV-INT

A distribution PSS concept developed with designers led the SME to an idea of forging relationships with public bus service providers to various destinations. This would improve shipping situation currently experienced by the company where courier services are often not affordable for their customers and normal mail takes long to be delivered. The shoe care PSS led SME to refurbishment of old items which had been pilling in their workshop. During the evaluation interview the owner mentioned that they had started refurbishing and selling old shoes to recover mainly material costs for slow moving products.

> *"Some of the changes I have made include refurbishing old items. I have been able to sell others. I was not targeting to sell at high prices. I wanted to recover material costs".* SME B co-owner: EV-INT

8.2.5.4 Empowerment and coordination

Interpreting the company's vision led to developing concepts on shoe care/rent PSS (Figure 8-10) and a distribution PSS (Figure 8-11). This was rather a difficult process since the SME, who had not done any design work before, had to be engaged in

both the product and service aspects at the same time. Further constraints were the scope of this process guided by the company's interest specifically on shoe repair; broadened by designers to shoe care. An observation during this process was that the SME got distracted easily by getting excited about the rental aspect of PSS and kept stepping out of their shoe making business. The company mentioned to designers renting out traditional dance attire following a study that introduced PSS to them in chapter 6.
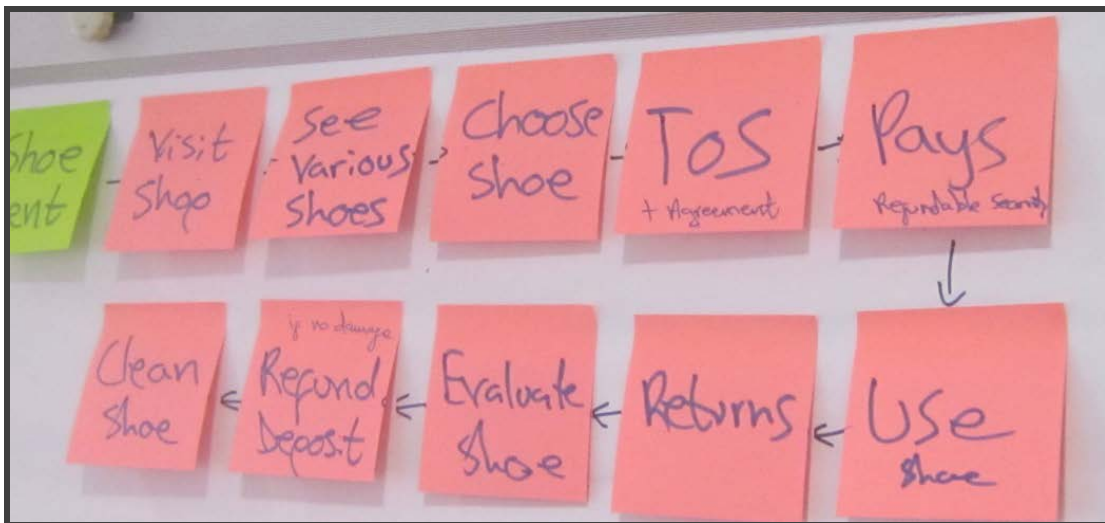
Figure 8-10: Shoe care/rent PSS

Figure 8-11: Shoe distribution PSS

Design exploration of ideas about show care, focused on designing for repair. This would need a new shoe design targeted at shoe renting. Though the owner had

initially resented and dismissed this idea as not possible, she embraced it as designers persuasively used question and answer, quick sketches (Figure 8-12) and recording of thoughts on sticky notes. This supportive approach made SME see potential in the proposed PSS. Although the final proposition presented a potential roadmap, during evaluation interviews with designers they cautioned the need to continuously instil the capability to investigate user needs in this SME. The caution followed on the company's indication that they had stockpiled shoes that people never bought from them since they did not like them.
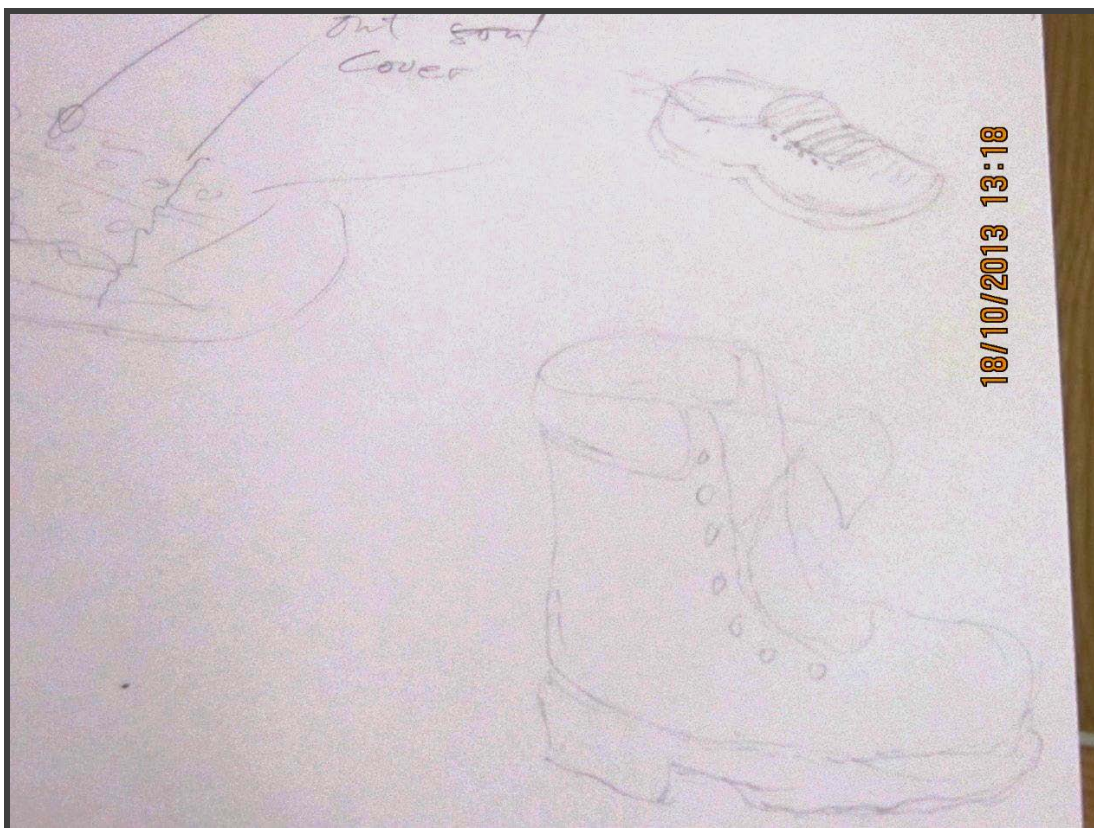
Figure 8-12: sample quick sketches steering dialogue for SME I

8.2.5.5 Organisational outlook

After the workshop the company took the initiative to approach shoe boutiques in town with the help of their support network. They wanted to build a working relationship with the boutiques to operate as their selling outlets. The shops requested to see samples of their work as a start to the negotiation process. This was following on the distribution PSS developed during the workshop. Although this interest was an indication of positive reception of PSS by the company, premature

moves well ahead of planning were likely to make good intentions fruitless. The company had not yet assigned resources to nor developed further any of the PSS concepts proposed during the workshop.

Identifying stakeholders was key to the company's retail market access aspect of their vision. The company surrendered this role to designers. Working with designers was seen as a troubleshooting activity, resulting in the company's observation that design had the capacity to aid planning, development and implementation. This led to the discovery by the company owner that they needed a brand to make themselves visible as a shoe manufacturer and supplier; something the owner agreed to that it was pulling them down.

> *"As you can see, the name XX [translates to queen bee] does not really say anything about shoes, even the logo. I think I should try and change them because the brand must sell you. I think my brand is pulling me down".* SME B: ACT II

8.2.5.6 Perceived added advantages

The influence of designers interacting with the company at a strategic level had given the company ideas of retaining existing customers through their distribution PSS. Relationships with stakeholders like shoe retailers and boutiques were welcome for their potential to increase the company's visibility and access to market. The influence of a relationship with designers would help the company develop a new shoe design for ease of care and repair. This would reduce repair costs often incurred by the company for small profit margins. Les frequently used shoes like safety boots in some cases would also be supplied for rent at organisations where a need had been identified. The outcomes showed a definition of a construct that;

- The SME had an emerging business strategy and product strategy for shoe care and distribution.
- The role of the designer as an external partner is still extended to key decision making when the company is convinced of designers' capabilities beyond designing material products.

8.2.6 Conclusions

SME I case was the most complex yet out of the three the one that showed most enthusiasm. Enthusiasm was demonstrated by this case company right from the beginning of the project when sustainability and product service systems were introduced. However, this seem to have caused some confusion before this workshop as all potential trial and error PSS offerings mentioned by SME participants during the workshop were not related to the company's core business. This was making the company lose focus in their main business of shoe manufacturing as they were drifting to any other services they could provide out of leather products. However, after the workshop a more focused approach was taken by the SME. The company set to embark on the demanding task of engaging their stakeholders who were identified with designers during the workshop.

The seasonal sales of school shoes and lack of guarantee that the company will always win tenders became the central point for the company's interest in looking to diversify its market. Investigating user needs was recognised as a key design capability that can help the company in this quest. Even though the owner was open to design exploration, she was more inclined to PSS than other design capabilities seeking to enable the company develop their own products. Limitations imposed on the company by shoe mould requirements, including shoe sizes and cost of the moulds were the basis of this little interest in designing shoes. The welcome idea of designing for repair would then reduce design to superficial functions as incremental changes in the existing designs keyed to existing moulds.

The observations above illustrate that even though the company was interested in the concepts of sustainability in line with their repair business and PSS to enhance access to market, limitations of a half day workshop made absorption of the role of design in the entire process a bit difficult. Present company expertise was not anything more than moulding existing shoe designs on existing moulds. Although the company complimented a design approach for providing structure in the company, designers would still need to play a major coordinating role between themselves and the SME. This would enable the company to absorb design capabilities intended to redefine a shoe in terms of the design and its use.

8.3   3rd Workshop: SME B - Bag manufacturer

Company: SME B

Industry: Fashion bags
Year established: 2006
Highest qualification: Degree in Design & Tech Education
Number of employees: 6, including owner/manager
Main product: Ladies' fashion bags
Main projects: Supplying curio shops
Main market: Business2Customer

Figure 8-13: Basic company profile

8.3.1   Introduction

Across the three SMEs that participated in the workshops, SME B is the only company that was started as a manufacturing company. The company's main product is ladies fashion bags. The company has since expanded their market to travel bags and laptop bags. They also have a market segment they term corporate gifting. For this market they mainly produce gifts and symbolic items out of leather often representative of the target corporation. Samples of the company's products are shown in Figure 8-14. The company's strength over the years has been its handcrafting capability, leading to each product slightly varying from the next even though the design may be the same. This capability has been consistently maintained over the years through retention of the same staff since the company was established in 2006.

Figure 8-14: SME B sample products

There is not much the company is doing in terms of design innovation. One of the co-owners/managers acknowledged that they modify existing designs through incorporation of Setswana traditional patterns, coupled with handcrafting. Engaging with designers made the company realise they had deviated from their vision. Although the company had a clue of what design is and how indispensable it is, especially in the fashion bags industry, the owners confessed they had not been designing. They termed the workshop setting an ideal environment for their company where ideas are explored with designers.

8.3.2   Site visits and consultations

Set up with the intent to design and manufacture bags, the company envisioned itself as a leading designer brand in leather crafted bags. The main target market for the company is B2C locally, regionally and internationally. The geographic dispersion of the market has motivated the company to open retail spaces in neighbouring countries to improve access of their products. Limited design input in the products to offer price competitive options, has especially in the local market, led to customers preferring fake products of established brands from Asian competitors offered at cheap prices. In view of this challenge, the company became motivated to engage with industrial designers. Outcomes of the visits are summarised in Table 8-5.

Table 8-5: SME B basic resources and vision

Company's basic resources	6 employees including the owners/managers Hand tools 2 work benches A multi-purpose workshop with shared machinery across other SMEs in the incubator
Company's vision	To be a leading brand in leather crafting. In order to drive this vision forward, the company aims to be a well-established and specialised bags manufacturer

8.3.3 Proceedings of the workshop

SME C was the most engaged in their interaction with designers during their workshop when compared to the other two. Right from the beginning the SME participants commanded a lot of ownership and knowledge of their company. This almost dominant behaviour by SME participants was also characterised by a lot of resistance whenever something new they thought would not work for their customers was mentioned. Their leadership role in activities was helpful to show designers what the company lacked. When the group developed personas the SME became more interested. As these arbitrary human beings were developed, the SME minimised rejecting new ideas following insights of differences in values and attributes for each persona.

The company had also brought samples of its work from as early as when it was set up (Figure 8-15). These exhibits were referred to throughout group activities often leading to designers rapidly sketching more alternatives with variations of form and material usage. Visual communication further committed SME to a design-led approach. For this SME, the role of designers shifted from leading the way to being team members. However designers still provided the processes demonstrating capabilities of how to go about the value creation process until a proposition is reached. Table 8-6 shows a summary of activities and their outcomes.

Figure 8-15: A 2006 handcrafted clutch bag by SME B

Table 8-6: SME B activities and outcomes

Activity	Outcomes
1. **Team building (Lost in the desert island)**	Vastly varied products brought together for survival SME's ability and interest in exploring solutions
2. **Aligning company vision towards a PSS focus**	A defined SWOT analysis for the company Possible solutions to align company vision to a PSS business approach Defined possible PSS strategies and how they can be implemented Defined PSS model at 3 levels • Strategy • Concept • Implementation
3. **Building customer experiences and prototyping**	Product oriented PSS mainly • A bag care PSS • A bag accessories PSS Use oriented PSS • A bag rental PSS
4. **A business pitch**	New business avenues Sustainable business operation with services to make money Clear definition of how SME will work with stakeholders to build feasible business offerings

8.3.4   Key observations from the case

8.3.4.1 Significance of prompts

SME C was immediately interested in the design language and called design an eye opener. The willingness to have an open mind and engage came with the realisation that they had been reproducing existing work. The company observed that their state of stagnation contributed to them bottling up their creative intuition. With the initial set up intent as a design company, the co-owners were happy to work with industrial designers. The company wanted to move away from short-term financial gains generated through survival techniques. These survival techniques had in the past derailed the company from manufacturing bags to almost anything they could make out of leather to generate quick money. From design, they wanted to understand how user needs are investigated to enable them exploit niches in the bag market. From PSS, they wanted to diversify their B2C main market through provision of services appropriate to functions users exhaust from their bags.

8.3.4.2 Building understanding

Co-design activities took off to explore SME's interest with a design and PSS mind-set. In pursuit of this dominant SME's interest, the group cultivated SME's understanding of PSS and its benefits around three prospects;

- Bag rental PSS for events and busy customers
- Bag care PSS including upgradability and other changes in look and feel
- Bag accessories PSS offering enhancements to the look and feel of the bag and the owner.

The SME's initial resistance in service offerings was that they were a small business who held firmly to ownership of leather products as valuable and cherishable. When the group developed personas the company began to turn around. Since investigating user needs was one of the company's areas of interest, they participated with a learner disposition. At this point designers entertained SME participants' dominant trait to give their personas attributes so that they describe real customers. The description of their customers covered attributes ranging from

loyal customers who like high quality products and fancy surprises to busy customers.

> *"We have a situation with this one client. The bag is very old. The zip is worn out. Just to get that bag off the client is impossible because she is always wearing it. I think she's Tom"* [see Figure 8-16]. SME B Product Development manager: ACT II
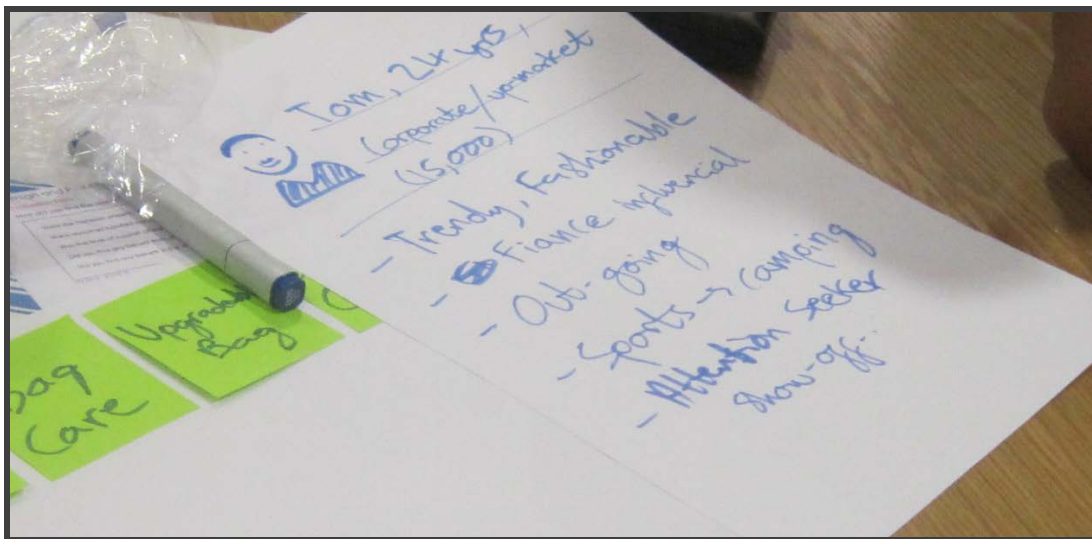
Figure 8-16: SME B third persona, Tom

With the aid of personas the company began to appreciate a PSS strategy for such customers who often need repair or bag upgrade services. Through personas as a lens, the rough and yet undeveloped propositions began to make sense to SME participants.

8.3.4.3 Reflections and familiar experiences

SME participants enhanced their workshop experience with their real life experiences. This was a deliberate move to tap from designers how such situations could be handled. Throughout the workshop SME participants consistently made reference to their customers. Designers intuitively responded by adding more attributes to the appropriate persona. This approach gave SME participants more confidence in the way designers had guided development of personas as a tool to investigate user needs.

"Yea, because there was this one time when Lolo [one of their customers] brought her bag for repair and she had to put her stuff in a plastic bag. I'm starting to like this bag rental idea especially for trolley bags. Just recently Fifi [one of their customers] had to travel. She didn't have a bag and she didn't have money to buy a bag. I think a whole lot of people find themselves in that situation where they don't have money for a bag but they need to have a travel bag and a trendy one for that matter. So that can also be a service that we provide". SME B Product Development Manager: ACT III

The company began to link PSS and design benefits to their business. The link was further clarified as SME participants themselves began to pick more examples of PSS providers within the geographic location of their market. The awareness that potential customers may be familiar with PSS in other industries gave the company confidence to embrace it as a potential business strategy in the bag industry. Since the co-owners were at different levels of understanding, more assimilation examples were brought forward from the male co-owner who appeared to have been excited by the idea in the bag industry.

"Let me show you this; [directly addressing his wife and co-owner] there are these supercars that AVIS has and people go there to rent them out for events like weddings, a luxurious car that they cannot even dream of buying it. They do however for a day drive in them on their wedding day and everyone see this person driving a big car. They return it and go back to their own Toyota corolla". SME B Marketing Manager: ACT III

8.3.4.4 Empowerment and coordination

Earlier propositions on bag rental, bag care and bag accessories were explored. During evaluation interviews SME participants were able to define their role and the role of designers looking at their company as a PSS provider.

"Our role as a company is to be there and lead the pack. The role of the designer definitely will be to facilitate this process of building this vision. So we [refers to the

company by name] and designers are interlinked". SME B Marketing Manager: EV-INT.

During exploration the company expressed their dislike concerning renting ladies fashion bags and went for renting travel bags. This was mainly a mind-set issue based on the assumption that ladies do not want to be seen with something known not to be belonging to them. Designers proposed events as a market which won SME's buy-in to expanding rentals to both travel and fashion bags. Through negotiating with SME participants, making reference to customer journey maps developed for the concept SME favoured would work, designers addressed the mind-set issue. Consequently, a bag rental (Figure 8-17) and bag care (Figure 8-18) concepts were explored.

> *"This is mainly for a travel bag. If we have the ladies fashion bag, how do we see this changing? Is that a service you might be interested in providing? Ladies fashion bags for specific occasions?"* Designer A: ACT III
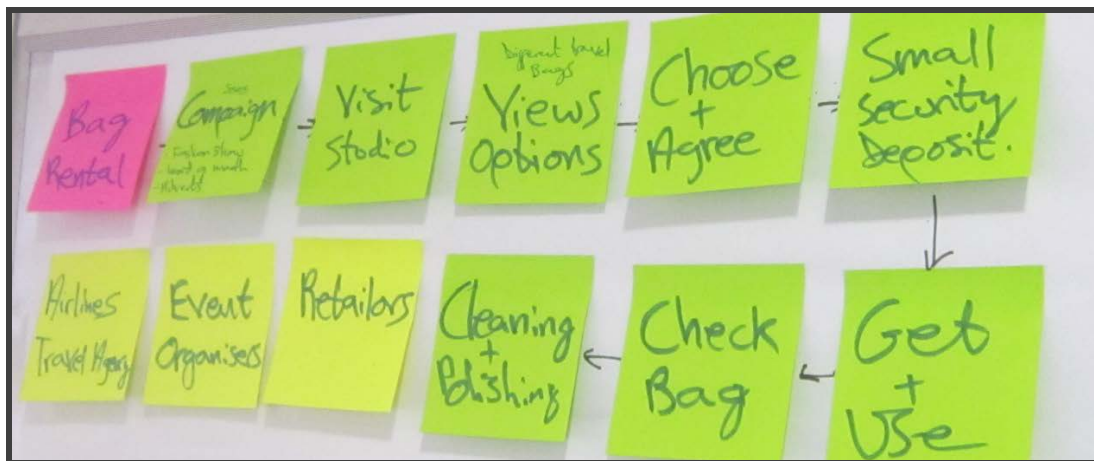
Figure 8-17: Bag rental customer journey low fidelity prototype

Figure 8-18: bag care customer journey low fidelity prototype

The bag care and bag accessories PSS ideas were based on what the company was already doing. Bag care had been done with no profit. As a PSS it was developed for busy customers and would have a care plan over some years. The use of customer journey maps by designers proved invaluable in supporting this SME see profitability of what they had been doing out of courtesy in the case of bag care. In the case of bag accessories, the company had been selling these small items separately with small profit margins although they could not supply any records. Quick sketches were used to support the discussions about bag designs (Figure 8-19). Sketching got SME participants in the modelling approach adopted by designers.
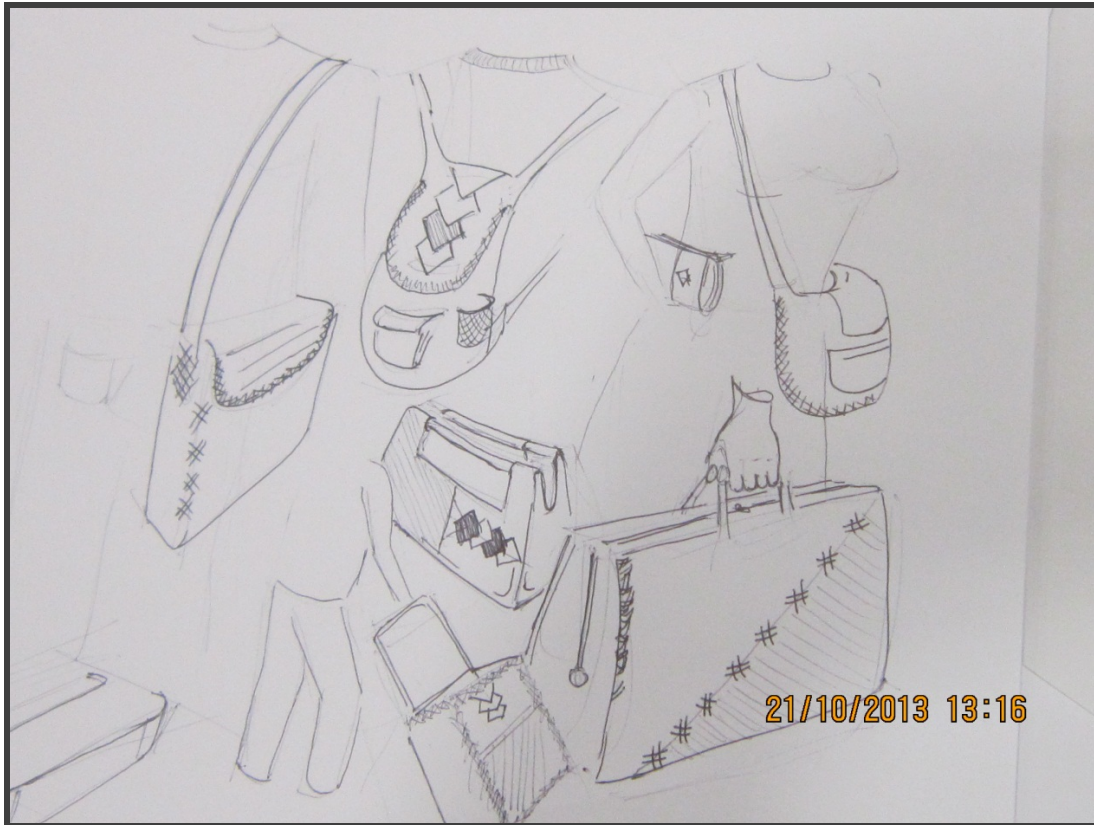
Figure 8-19: Preliminary bag sketches supporting discussions with SME B

8.3.4.5 Organisational outlook

The company's contentment with working alongside designers as facilitators anchored their point of view that a gradual complete overhaul of the company would be beneficial in the long run. This was especially recognised after the company's acknowledgement that they had deviated from their initial business intent as a design company. This overhaul process was viewed as an opportunity to build a brand. Building a brand would give the company's products and services recognition alongside brands that customers prefer to buy at a sacrifice of quality over name.

Since working with stakeholders as a novelty for the company, they recognised designers as key stakeholders to help them identify other relevant stakeholders. This appreciation was transferred from one of the activities during the workshop when the group identified potential stakeholders for their PSS ideas. Lessons from the fashion industry were also embraced to help redefine a bag for the company and its customers. This made the fashion industry an important stakeholder, with its value emerging from an existing casual and occasional relationship on events like

fashion week. The promotion of a rent-a-bag PSS through rentals to fashion designers for their shows would not only generate profit but present a rented bag as an item of fashion.

8.3.4.6 Perceived advantages

Although initially rejected, the rent a bag idea gained popularity with the company to be used to fight competition from cheap and non-authentic leather bags from foreign competitors. This would also be among the company's differentiation avenues for various customers. With the introduction of a design-led approach and a relationship with designers, the company would also stop making modifications to existing designs and launch their own, adaptable to their PSS offerings. The company's quick scan of the market is that there are currently no companies in the local bag industry with PSS offerings. This would give them a leading edge and secure their position before competitors come in.

The company's handcrafting capability was deemed even more important in PSS as each item would have its unique look and feel. Designing for handcrafting would also make separation of components easy when the products are taken back. The company's perspective of product take back was purely economic. Old material would be recovered from used bags and given new definitions in products designed to be manufactured out of old looking leather. The anticipated benefit of this approach was that it would cut the company's cost of virgin material and sustain material circulation in the system.

8.3.5 Conclusions

The confession given by the co-owners that working with designers was the ideal setting for their company was an insightful revelation of how they view design. As indicated by the company vision in table 7-6, design was to be the main driver of the business. This was never developed as the company was distracted by survival tactics of income generation focusing on making items that generated quick money. Their interpretation of design was limited to incremental changes in existing products by incorporating Setswana cultural elements. This was supported by their handcrafting capability which the company had developed over the years. The

company's exposure to design during the workshop gave them a different perspective. Although both the product and service dimensions were appreciated, the company seemed to have placed more emphasis on the product aspect as this directly related to what they were presently doing.

The company's handcrafting capability was the kingpin for most decisions during the workshop, influencing the direction designers wanted to take. The company wanted to retain this capability as it recognised it as a major differentiation aspect in their products. Design creativity and exploration was recognised as capabilities that can support strengthening this handcrafting capability. The need to expand the existing market and offer cheaper alternatively competitive to cheap and unauthentic imports in the market gave design a leadership role. Though the company's most interest was in product design, investigating user needs demonstrated that not all needs can be met by providing a material product. Cheaper offerings were demonstrated in a service context. The company's resistance to provision of services was defeated by their understanding when services they had been providing non-profitably showed they could bring returns.

The recognition of design creativity as a capability to support the company's service offerings was a pathway to a longstanding relationship with designers. Through this relationship, the company's conviction was that they could increase their visibility in the market and establish themselves as a reputable leather bag brand. The company had also out-rightly admitted that design can facilitate interactions with their stakeholders. During evaluation interviews, the company mentioned that they were on talks with the University of Botswana to take student designers on placement. The company successfully got a student designer on internship between January and May 2014.

8.4   Cross workshop comparisons

The purpose of this cross workshop comparison was to pull out similarities and differences between each case company's interactions with designers. This was done across all the six themes to make them visible and intelligible, allowing further interpretations and conclusions about the participant companies. Particular attention was paid to capabilities designers deployed and inputs from SMEs, leading to a pragmatic way of defining how design capabilities impacted SMEs' mind-set towards product service systems to differentiate themselves.

8.4.1   Significance of prompts

Mozota (2006) categorises design capabilities in four ways of differentiator; integrator; transformer and good business through which design can benefit businesses at a strategic level. In the three case companies, different situations prompted them to engage with new knowledge. Both internal and external factors stimulated this engagement.

8.4.1.1   External factors

A prominent impulse that seemed to have triggered the engagement process was an external factor concerning the market. All three companies wanted to use design to help them differentiate although their perspectives about it were different. SME E's interest was to keep their B2B customers and open new B2C markets. Their grave concern was to have close up approach to investigate user needs using design tools and methods. This is a basic approach to using design as a source of competitive advantage. The orientation of designers with this SME was therefore on differentiation through services, giving PSS prominence in a furniture manufacturer.

SME I (a shoe manufacturer) was looking to transform their business since they wanted to explore new opportunities in B2C markets, which they have not actively traded in before. In their quest to creating new opportunities the company wanted to redefine a shoe in order to make a successful entry into this market segment. This would give their business a different outlook as compared to a traditional shoe manufacturer. The lead provided by the owner to designers of existing services

which are commercially viable ignited interest in PSS when designers interpreted the company's interest in turning to B2C markets with redefined offerings.

An interesting and rather more complex dynamic was from SME B. Here design was to be used as an integrator where it serves as a resource to improve user oriented innovation models. The company's need to diversify B2C markets ignited interest in investigating user needs in a way that does not predict the solution to be a product. Although their main focus was on their handcrafting capability in products, the willingness to explore the capability in a service context made the company tolerant to divergent design creativity on various PSS avenues.

8.4.1.2 Internal factors

All the three case companies wanted to learn something new at the point when they confessed they had been doing things the wrong way. Very often they were impressed by designers' ability to explore new solutions. The drive to launch something unique in the market and stop copying was evident. Being a furniture manufacturer, SME E recognised design creativity as an indispensable capability for their business. Through design creativity, tools and methods the company would be able to develop their own products and define clear processes to build a different working culture. This was also the case with SME I, who needed a systematic way to recover material costs. At an advanced level, SME B wanted to make design a bedrock of their business and use it in their gradual overhaul of setting up as a PSS provider. Designers' ability to demonstrate the value of services expanded the company's already existing understanding of design and its use beyond developing products

8.4.1.3 Strength of prompts

The strength of these prompts in each company was observed to be tied to SME participants' ability to grasp the thinking offered by designers. The owners would welcome exploring PSS ideas, mainly for commercial gains rather than environmental benefits. This was on the basis that designers were able to communicate in a clear way including using the local language to provide clarity to abstract concepts. Where there was doubted lack of clarity the companies resisted

any other idea which was not product related. In each case the prompts were considered significant when a financial benefit was demonstrated.

8.4.2 Building understanding

Generally across all the three cases, building understanding of how design can be used to drive the companies to adopting PSS was centred on the companies' visions. After exploration and dialoguing on the companies' visions and situational analyses using SWOT different strategies were used in each company to explore the potential of sustainable PSS. These strategies were primarily focusing on company specific prompts. However, some similarities were also observed in the way they were being deployed. The key similarity was that design was used as an engaging activity through its co-design approach where SME participants were equally involved in developing ideas and building common understanding of new concepts like sustainability and PSS. Design as an engaging activity was used in three ways:

8.4.2.1 Breaking passivity

An interactive approach to working especially with someone outside the company was a new thing for these SMEs. Sharing ideas, critiquing each other's thinking, referring to multiple sources, using various media of communication like sketches, sticky notes and verbal conversations were all new introductions to these companies. Moreover, the process designers adopt of understanding a problem then formulating a brief, narrowing down to specific objectives, formulating concepts and refining them was also a new experience for SMEs. The back and forth iterations involved in the designer's thinking process was often overwhelming for all SMEs, especially SME E. Visualisation of thoughts engaged this SME who was compelled to refer to these concepts put down on paper, and take direct questions posed by designers.

8.4.2.2 Infusing growth possibilities

The engagement with design thought process, tools and methods was targeted to specific company growth interests and priorities. Although this was deployed across all the three SMEs it was more visible in SME I, the shoe manufacturer, who insisted on growing their repair business. The engagement was more focused on consensus

building so that SME could be able to see the repair priority beyond what they understood. A proposed shoe care encapsulated the repair priority of the company further explaining PSS with the benefit of keeping customers through not only repair but overall care services including delivery and cleaning of products.

8.4.2.3 Offering balance to dominant business perspective

An empathic approach as adopted by designers to counter-balance the business as usual mentality. This perspective was predominantly observed in SME B, the bag manufacturer whose initial resistance to PSS was based on a strong position on product ownership, especially that most of their products were fashion products. Empathy from designers to understand the SME's market more closely lead to defining new markets like events to demonstrate PSS potential for the company.. This also resulted in propositions which were more product focused due the company's early registered interest in product design. Although the company had knowledge about the market and their business environment, they had not done anything new in business development. This availed an opportune moment for designers to propose PSS as a solution to their problem of being outcompeted by cheap Asian imports.

With the exception of SME B, all companies were not familiar with design. Although SME B was not necessarily designing, they could relate with the design process as they have been able to put things together with evidence of evolution of the idea. Though their products were based on existing designs, the addition of Setswana traditional patterns to them through their refined handcrafting capability provided them with a space to do a bit of designing. Understanding the value of sustainability in all the three cases was often observed to be a cost saving measure. PSS was seen as an opportunity to maximise on little company resources and build a rapport with customers. The limited understanding of the time scale required for the companies to build PSS strategies was a problematic issue as they wanted solutions which can bring them immediate returns rather than develop and define a strategic position in the market.

8.4.3   Reflections and familiar experiences

The primary use of design across all companies was as a disseminator of knowledge about market success through use of what SME participants knew. This was a common way designers adopted to transfer service scenarios from other industries into the leather industry and more specifically to company situations. Although examples in the context were able to give SMEs confidence about PSS, providing certainty of implementation by manufacturers was difficult across all three companies. There was a complex level of thinking required to connect these examples to the leather industry and bring them down to SMEs' operational level. Most of these examples were from big companies. Moreover, none of these companies were manufacturers but purely service providers.

Nonetheless, in the case of SME E the examples broke down the concept of supplying furniture to mean developing schemes to circulate furniture around users instead of selling volumes. For the shoe manufacturer, focus on building on their successes with shoe repair was further clarified. The company also saw an opportunity to assess their company processes. The company had not been active in building relationships yet they had 'penetrating retail market' as part of their vision. A distribution PSS sparked this initiative. Familiar experiences were imperative in SME B to demonstrate potential of ideas being proposed. The initial resentment of ideas as not feasible was very high until the owners took a leading role in providing PSS examples they were aware of in the service sector. This approach vetted most concepts and provided a conviction to the company that design held the future for their company. This thinking unfolded a lot of potential stakeholders for the company even though their immediate interest was in working with designers.

Through making reflections on newly acquired knowledge at the workshop and reviewing contextual examples, clarity of goals of what was achievable was provided. A reflection on company resources was often a barrier when a certain technology was required to support delivery of certain services. This slowed the companies' zeal to implement PSS down and promoted the behaviour to think of it as a future development when the company had resources. Contrary to SME's

position on resource intensity, designers saw PSS for micro SMEs as a development that can be nurtured instead of product oriented models currently being supported by the national branch support network.

8.4.4 Empowerment and coordination

The pinnacle of this theme was in design providing SMEs with tools, methods and process to develop ideas in a logic and systematically engaging way. The focus was in coming up with tangible outcomes from SMEs interactions with designers. Through this empowerment process key observations linked to some of design capabilities like sketching, prototyping and working through iterations. Design tools increased interactions between designers and SME participants further developing trust and confidence in using design and working with designers.

The major role of design here was a bargaining tool through these capabilities to facilitate SMEs' ownership of ideas being developed. The level of interaction required cultivated co-designing in SMEs. However the final decisions about propositions were always made by the companies. For example when building customer journey maps for SME B's rent-a-bag idea, designers were keen to expand this idea into fashion bags but the owner wanted to keep it to travel bags. This was related to experiences they had had with some of their customers who needed travel bags but did not have money to purchase some. Although the SME ultimately confessed seeing potential in the idea for fashion bags, they were not as enthusiastic as when they talked about it for travel bags.

SME I made exploring ideas outside their repair priority difficult. While the company appreciated design tools and the process, the possibility of thinking outside of what already existed in terms of moulds for shoes was non-existent. Before the workshops decision making in the companies was not based on any design process but on intuition. This intuitive decision making has led to stockpiling reported by SME I, stagnant growth reported by SME B and no product development reported by SME E. Working with designers was a welcome development by all companies. Each of them had their peculiar situations under which introducing designers would need defining roles. In the case of SME E,

demystifying the functions of designers and the carpenter who had been thought to be a designer would need clarity to keep a working relationship. For SME B, though the company insisted to be recognised as a designers' home, reducing designers only to focusing on product aspects may hamper attempts to develop a product-service mix.

The main barriers observed during designers' interactions with SMEs were as follows:

- Time to design was never part of SMEs usual operations. The back and forth prototyping process appeared to have been overwhelming for SMEs and demanding a lot of knowledge as it was an uncertain journey of finding solutions. This process depended on existing knowledge of stakeholders, knowledge of materials, processes, the business community, and customers which in most cases SMEs could not supply.

- Lack of documentation by SMEs of their decisions and processes meant there was no evidence of how they take decisions. This prolonged the situational analysis process so that designers had a feel of how companies produced their products.

- Design was new to the companies. Introducing such an abstraction and its tools at the same time harnessing its capabilities was a very steep curve for SMEs in a half day workshop. The limitation on the time availed for these interactions were imposed by the companies' business commitments.

- Sustainability and PSS were abstract concepts, the absorption of which could not be effectively paralleled to absorption of design in a short period of time. However, developing design capabilities further in these SMEs can support absorption of these concepts as a creative culture would be helpful.

- Designers had a feeling they should have brought their work to the workshop to quickly show SME participants what they are capable of and what they have done as a way of removing the occasionally observed element of doubt and lack of trust in their capabilities. SMEs' did not see designers as commercially aware people.

8.4.5 Organisational outlook

The impact of PSS prototypes developed during the workshops was observed in company resources and other areas not directly related to product-service strategy. All companies recognised the value of building brand equity. This emanated from the addition of the service component in their traditionally product oriented approach. Exploring customer experiences using customer journey maps brought to the companies' attention such key words linked to brand equity as memorable, easily recognisable and superior quality products and services.

Building brand equity would mean cultivating other capabilities such as technology and key stakeholders to complement existing company resources and capabilities. A new product would be developed with designers to meet a specific user need as identified. In the case of SME E's S-line furniture, emphasis was on creating a memorable and convenient experience for new professionals on short stay in town. None of the company's existing products were recognised to be suitable for this need. SME I wanted to develop a redefined shoe that will make them easily recognisable. Their recognition concern also meant they would change their logo and company name to rhyme with shoe business. SME B would allocate more resources for design, and consider hiring a designer to increase their human capabilities relevant to exploit their handcrafting capability further.

A dynamic PSS provider environment meant other resources needed to be mobilised. For example, all companies did not have a website to increase their visibility, though SME I and B indicated they were working on them. There was no well documented company product portfolio that could give one a feel of what the company was offering. All these deficiencies were evidence of a lack of strategy which received a lot of attention after a human-centred design approach adopted by designers during the workshops. The attention drawn to these emerged when persona attributes were used to inform building customer journey maps. The companies viewed various customer experiences from each PSS as strategies to improve their competitive advantage.

However, all companies needed more time and resources to develop their propositions further and implement them. For these micro SMEs operating with limited resources, dedicating their efforts to developing these propositions further without any external support would most likely paralyse them. A few attempts that SME E and SME I had after the workshops were made when they had time. During evaluation interviews SME E reported approaching one of their big business customer on drawing contract agreements for taking care of all their repairs and re-upholstery. This proved to be a time consuming exercise demanding a lot of back and forth communication and meetings between the SME and the organisation. SME I attempted, with the help of their support network, approaching shoe boutiques in town to sell their shoes for them. The result of these visits meant allocating resources for the requested samples to initiate the negotiation process. Although the companies did have an understanding of developing sustainable PSS and explored prototyping some ideas using design capabilities, the limitations imposed on them by their resources is likely to hamper exploitation and implementation.

8.4.6   Perceived advantages

Tan et al (2009) observe two possible continuums to construct PSS; building on the product and its technologies and building on the user and their experiences. Given the low technology orientation of these SMEs the former was not evident in their motivation to adopt sustainable PSS but the latter. Helfat and Peteraf (2003) describe an activity as a capability when it had reached a threshold of practice. The SMEs' interest in developing PSS using an approach drawing from users and their experiences was a gateway for developing user-centred approaches as a capability to develop, facilitate and deliver PSS solutions. The companies' perceived advantage of differentiation would be dependent on how the companies deploy their resources in investigating user needs and levels of interactions with stakeholders. The impact on the companies' resource base is highly likely across all the three case companies. It was observed that companies prioritised perceived benefits due to the impact on resources.

8.4.6.1 High priority benefits

For basic business reasons of increasing profits, companies wanted to be rewarded by design and PSS. This reward was in their ability to differentiate themselves from competitors. Strategies to reap from this reward in each company were different. A common dimension across all of them is that designers were regarded as the key stakeholders. Their main role would be to facilitate the process and help identify and bring on board other relevant stakeholders demonstrating how they would also benefit.

SME E wanted a strategic position in the furniture markets. Contractual deals with business customers for repair and re-upholstery would assure the company income whenever the organisations had jobs. For individual customers, the new lines of furniture for customisability and adaptability would allow the company to attract users with dynamic needs. Since the owner maintained that manufacturing costs are high and selling individual products was not successful, offering services was accepted as a cost effective way of generating profits. The number of products the company could afford to manufacture with their current resources every month was also low. Generating more profits from that output was a priority.

SME I wanted to expand and commercialise their shoe repair services and gain visibility in shoe retailing. The provision of this shoe care service (as expanded by designers) would be their unique selling point in the retail market. The company saw this as an opportunity to diversify from their dependency on tenders, which can be scarce and unreliable at times.

SME B wanted to gain a leadership position in the local market where they were suffering a big problem of competition from cheap unauthentic imports from Asia. Since the selling point of these cheap imports was nametags of established brands for fashionable leather bags, the company wanted to promote a rented bag as a product of fashion. This would allow them to offer their products at competitive prices and make them accessible to a larger pool of their clientele who would otherwise not afford to buy a fashion leather bag for ownership.

8.4.6.2 Low priority but key benefits

Although benefits categorised as low priority were important in facilitating achievement of high priority benefits, they were not the main reason why companies got interested in design and PSS. All companies favoured voluntary product take back as way of promoting sustainability practices in their businesses. Although this was implicit, the main reason for this especially for the furniture manufacturer and the bag manufacturer was material recovery. The companies had placed high value on old leather, an idea entertained by designers with their concepts of new old-looking products. A cyclic approach to material usage was seen by all companies as a strategy to reduce the amount of virgin leather purchased, hence cushioning the cost of raw materials. Implicitly, this would promote resource efficiency as the companies establish themselves as PSS providers producing fewer products for multiple use cycles.

8.4.7 Conclusions

For all the cases, it was too early to make conclusions on repetitions of activities undertaken during the workshop to measure how much they have developed into capabilities. There is need for more time to be given where these companies can take up one of the propositions produced during the workshop as a project and go through a rigorous process of developing it further until it is delivered to customers. A fundamental observation emerging is that the companies developed an awareness and appreciation of using design as a resource for capabilities that enable sustainable PSS development and value as a competitive advantage.

From the experiences of interactions with the companies and their interactions with designers some trends have been observed:

- A visible impact of manufacturers' mind-set change was demonstrated by the companies' prompt action following the workshop, especially SMEs E and I. The extent to which the companies can keep moving towards that direction depends on availing a repository of knowledge and skills for support. At the same time, the owners would need to bring on board all their current stakeholders to enable everyone move with the same mind-set. During

evaluation interviews all companies requested copies of proceedings from their respective workshops to serve as a guide.

- All companies are willing to work with designers but at different levels. SME E and I are open to negotiating with designers through their support network to receive continued support from designers. SME B is willing to hire a designer and to this date has a memorandum of understanding with the University of Botswana to accept student designers as interns for a period of three to four months. The purpose of engaging designers is to build through design capabilities a culture of innovation.

- The considerable amount and complexity of knowledge and multi-disciplinary nature of sustainable PSS displayed difficulties for all companies. These varied from looking for an idea (SME E) to interpreting the business network to look for value spaces (SME I) and redefining fashion products in a service context (SME B). A summary of how each company progressed in using design during the workshops is provided in Figure 8-20. Figure 20 was developed based on cross comparisons per each theme described in chapter 7 and further elaborated in chapter 8 on how each SME which participated in the workshops responded to using design towards service oriented differentiation.

Progression of SME participants on how they used design during the workshop

Annotations:
- drives SMEs to inquire about PSS and its business benefits
- builds confidence in SMEs to engage
- perspective of how SMEs would create added advantage
- makes SMEs refer to examples they are used to
- gives SMEs a picture of their organisations as PSS providers

Legend: reciprocal relationships / Linear relationships

SME participant companies

	Significance of prompts	Building understanding	Reflections and familiar experiences	Empowerment and coordination	Organisational outlook	Perceived added advantage
SME E Furniture manufacturer	Design as a creative tool to keep existing B2B customers, open B2C markets, differentiate from competitors, using design tools and methods to investigate user needs	Design as an engaging activity to break passivity and business as usual mentality, translating obstacles to PSS opportunities	Design as a disseminator of knowledge about market success through use of what SME participants know, driving SME to position its vision in a PSS context	Design as a bargaining tool through its process and tools, enabling SME to co-develop PSS concepts and facilitating the process to allow SME ownership of ideas	Design as a strategy to deploy company resources, identify key players and value addition through product service systems	Design as a reward through differentiated PSS offerings for various markets and promotion of sustainable practices for economic benefits
SME I Shoe manufacturer	Design as a transforming tool to redefine product offerings in new B2C markets, recover material costs and increase profits	Design as an engaging activity to infuse growth possibilities through consensus building in company growth priorities for PSS offerings	Design as a disseminator of knowledge about market success through use of what they know, to focus on developing SME success stories as PSS offerings; design also used as a yard stick to assess processes	Design as a bargaining tool through its process and tools, enabling SME to co-develop PSS concepts and facilitating the process to allow SME ownership of ideas	Design as a strategy to deploy company resources, identify key players and value addition through product service systems. The need to revisit company brand is realised by SME participants	Design as a reward through differentiated PSS offerings for various user needs, promotion of sustainable business practices and cost recovery measures
SME B Bag manufacturer	Design as a creative and integrating tool to diversify B2C markets through investigation of user needs move from income generation to entrepreneur development	Design as an engaging activity to offer balance to dominant business perspective through empathy, to redefine value for PSS offerings in B2C markets	Design as a disseminator of knowledge about market success through use of what they know, to show new potential in propositions. SME rejected as not feasible, and portray SME as a design company	Design as a bargaining tool through its process and tools, enabling SME to co-develop PSS concepts and facilitating the process to allow SME ownership of ideas	Design as a strategy to deploy company resources, identify key players and value addition through product service systems. Initial business intent resuscitated	Design as a reward through differentiated PSS offerings for various user needs and promotion of sustainable business practices. Handcrafting redefined

Figure 8-20: Summary of cross case comparison

235

The implementation stage of propositions co-developed during the workshops to measure whether perceived advantages have been realised is out of the scope of this research project. The dynamics of business activities for each company has determined how capabilities have been developed. For example SME B already had a co-owner with a design background and had their products selling in neighbouring countries. The SME's knowledge of market trends was also vast. This gives them a different perspective of competitiveness, further driving their zeal to develop design capabilities and explore their business in a service context. Since sustainable PSS benefits are reaped in the long term, it is likely that SMEs willing to grow in this direction will engage in entrepreneurship develop rather income generation. A design approach to this transition will also imply that capabilities are constantly developed to expose SMEs to a currently seemingly complex and expensive but worthwhile expedition.

9 Discussion

This chapter collates findings and insights from previous chapters and raises themes to guide discussion of these findings and insights, illustrating an analytical response to research questions. Further, a critical reflection on research findings is demonstrated throughout this chapter, showing how major outcomes of this research evolve into a process for practical use and academic discussions.

9.1 Introduction

The emphasis of analysis in the three explorative studies of this research has been a gradual development from *what* should be addressed to enable SMEs to adopt sustainable PSS as a competitive strategy to *how* they can do it. In this discussion chapter the aim is to understand and shed light into some of the observed phenomena from the research findings and their place in previous literature. The discussion chapter proposes themes around which it is organised to debate the essence of PSS in SMEs, how they can compete through the strategy where design capabilities are invaluable resources and the value of bringing in designers to facilitate non-design led SMEs' innovation process in light of sustainable PSS. These themes are discussed in the following order;

- The value of understanding the context
- Design can build a positive mind-set for SMEs to adopt PSS
- SMEs with little or no prior design knowledge can adopt PSS
- Competitiveness and entrepreneurship development can be driven by sustainability targets
- Support intermediaries can promote SME competitiveness through sustainable PSS
- SMEs can be engaged to develop a competitive and sustainable PSS strategy
- The practical value of building design capabilities for PSS adoption

In addition, a Design Capabilities PSS process (DeCap PSS) is reviewed as it evolves during this discussion, in light of expert opinions populated during the Delphi study, the authors' experiences based on contact with the SMEs themselves and insights from extant literature. Finally the practical value and transferability of this process into other contexts are proposed with reflections on current methodologies and tools supporting PSS adoption in industry.

9.2   The value of understanding the context

The motivation to adopt sustainable PSS in a predominantly product oriented environment depends on contextual dynamics. The collaborative nature of PSS means that there should be common goals between various actors, demonstration of win-win scenarios for partners and an effective common language to enable effectiveness of the development process. This joint enterprising impacts on and is heavily influenced by the socio-economic environment of the PSS provider and users. For a traditional product manufacturer novice working with this web of actors, redefining what a product means is the first headache. This is especially applicable in the case of SMEs, who usually operate in isolation. Defining relationships is among the biggest barriers for PSS adoption (Bianchi et al, 2009; Tan et al, 2009). Other barriers directly linked to the relationship definition problem include fear of customer reaction and communication of support materials for the transition from concept to practice. Building a relationship that can enable positive and welcoming reactions from customers require a lot of support firstly in developing strategies that can learn from the already existing service industry and how the PSS concept is packaged and communicated to potential stakeholders. In the next sub-sections these are discussed as mature service culture and packaging PSS to SMEs.

Discussion of these issues is centred on understanding the socio-economic contexts in which these SMEs operate. Findings of the Delphi study reported in chapter 5 have provided insights on this issue. The Delphi study extends the debate of suitability of Product Service Systems and its benefits especially competitiveness for manufacturing companies, particularly SMEs, in developing countries. The experts' contributions provide a holistic picture of what a competitive PSS strategy could

comprise of in the context of small companies operating in a developing country like Botswana. The need for a business strategy that not only commits SMEs in developing countries to their businesses, but also builds a dynamic culture of innovation resourced by multi-disciplinary knowledge from collaborations and partnerships seems to be a collective position of the experts. Kayawe (2011) shares the same view as he reports on the skills compliment benefits of an integrated approach to supporting SMEs in Botswana especially by government institutions and the private sector.

Although some authors like Baines et al (2007) note PSS as 'potentially valuable for manufacturers based in developed countries', the experts support for the concept in a developing country like Botswana is in light of UNEP's (2002) position about PSS in developing countries. UNEP sees PSS as a strategy that can contribute to industrial development in developing countries at a service-economy level. This is an interesting view on redefining development from the perspective of both manufacturers and consumers. For customers, there is an opportunity to perceive wellbeing defined in non-product ownership terms as opposed to the destructive unsustainable trend of more material product acquisition. For manufacturers, this 'new' position of development characterised by product ownerless users and services has potential to provide environmental and economic benefits for both SMEs who often are resource constrained.

9.2.1 A mature service culture may promote PSS adoption

From this research the service component of PSS can be viewed as an opportunity for SMEs to improve their competitiveness as differentiation through services becomes more important than through product offerings. A mind-set change is crucial as customers need to be convinced of the value of satisfaction through non-product ownership where it was previously achieved through owning a product. An understanding of users' values and behaviours is critical to enable manufacturers to channel their PSS ideas towards offerings that will be acceptable in a service context. This may not be a concern for countries in Europe like Norway where a service culture is already at its maturity stage (Gloppen, 2009a; 2009b) or in developed countries as generally argued by Baines et al., (2007). From the

manufacturers' point of view this is a cause for concern in contexts where a service culture is still developing. A feeling of scepticism about acceptance of their PSS offerings is a barrier for adoption.

Lessons from successful service industries both locally and internationally need to be populated then fragmented for SMEs to understand and appreciate PSS. From findings of the workshops reported in section 8.4.3 this is an invaluable approach to win SMEs *buy in* of PSS, especially successful service scenarios they know. A skilful combination of these examples with other existing successful PSS examples where a service culture is still upcoming or already mature can help promote service oriented innovation. SMEs at the same time will also need a conviction of the economic benefits of PSS. From both the case study and workshops findings reported in sections 6.3.5.2, 6.3.6 and 8.4.1 respectively, the key driver for SMEs to adopt PSS was its economic value. Even though the goal is to achieve sustainability across all the triple bottom line aspects, environmental and social sustainability benefits of PSS need to have significant economic benefits. This is because SMEs generally have financial difficulties and are easily distracted from developing a business strategy due to their need to make money. This is generally for the purposes of keeping the business surviving. Advocacy for PSS from influential bodies like government, through policy interventions to promote servitization of manufacturing need to be a priority. This move will entice SMEs to promote a service culture for their customers through adoption of service oriented strategies like PSS.

9.2.2 Packaging PSS to SMEs: PSS or servitization?

The concept of PSS is still an abstraction to digest given its evolution from the academic circles. Simpler related terms need to be used to sell it to SMEs who often struggle to understand what it is and how it can work for them. Using the terms product service systems or servitization is still a dilemma. Although the inclusion of 'product' in the former is critical to articulate the value of a physical product present in the offering, using both 'product' and 'service' to refer to an offering is complexly radical. In the latter, using 'service' independently bares the risk of reducing PSS to be understood by SMEs to be only services as add-ons to

products. Although in both cases this is the first level of possibility, dematerialisation potential of PSS may not be achieved. Findings of the case study reported in chapter 6 demonstrate this emphasis by SMEs who generally understood PSS potential at a product-oriented level, with little drive to the next levels. The possible markets presented in Table 6-3 under section 6.3.6.2 also show SMEs' understanding of it as an expensive and sophisticated concept for the select few, except government institutions. This perception is heavily influenced by factors discussed in 9.2.1, and need a mind-set changing approach to embracing possibilities.

9.3   Design can build a positive mind-set for SMEs to adopt PSS

The contextual difficulties described in section 9.2 outline topical concerns that require strategies to address the mind-set issue of manufacturers being service providers. Responsiveness of these strategies to these contextual dynamics is crucial for PSS to be effectively adopted, lest it faces the risk of rejection viewed as an irrelevant and foreign concept. In this research, it was found that design can play a pivotal role for PSS adoption when used as a strategy to address competitiveness concerns of SMEs. The Systems Success Framework presented in section 6.6 from findings of chapter 6 captures this approach also in the context of sustainable design, and is further explored in chapter 8 in order to be able to identify how design can influence SMEs adoption of PSS through its capabilities.   The main influence from the Systems Success Framework begins with availing designers with unsustainable design capabilities.

The Systems Success Framework (SSF) places availability of designers with sustainable design capabilities at the centre of its implementation. This follows the identification of the missing relationship during data analysis, the implications of which were discussed in section 6.4. The PSS-based context of the framework is a result of PSS possibilities identified and discussed in section 6.3.6 identifying possible PSS markets and opportunities for SMEs who participated in the study. Exploration of issues in the Systems Success Framework was therefore important to engage SMEs develop the infrastructural capacity to break away from complacency and instil design innovation potential. This first issue in the framework under infrastructural issues concerning competitiveness SSF was the point of departure to

employ workshops as a methodology choice described in section 4.7.4. Engagement with designers would then allow, through a relationship that promotes between business and designers encourage interactions and networks to seek solutions for issues under the relationship SSF. These would then facilitate exploration of the Product Service Systems SSF as a capacity building exercise through exposure of SMEs to use of design tools and methods to aid PSS design under the SME capacity category.

Underrepresentation of design in SMEs has also been argued by Mozota (2003: 2006) and Acklin (2013), however with a particular focus on design management. There is an agreement between findings of this research and both Mozota and Acklin. In terms of competitiveness, there was complacency observed in SMEs as reported in chapter 6. When a smaller sample of the same SMEs was engaged in creative workshops reported in chapter 8, design engagement opened new opportunities for them and they began to see that there was a lot they needed to do. This supports Mozota's view of design as transformer where design is used as a resource to create new business opportunities and improve the company's ability to deal with change. Acklin's notion of design leadership in SMEs supports findings of this research as when SME participants were engaged with designers, they were able to combine their won expertise with newly acquired design expertise. In the process they were able to build capabilities like defining new PSS business opportunities and working iteratively with designers throughout using design tools to support their decision making process.

The use of design for PSS adoption in this research is an extension of arguments advanced by McBride (2011) and Manzini and Vezzoli (2003) who still contend underrepresentation of design at a strategic level. Further, a close-up position is adopted following Gloppen (2009a; 2009b), in terms of design leadership in service industries. Developing design leadership capabilities for PSS in product-oriented SMEs is the pinnacle of findings for this research from workshops described in chapter 8. These capabilities have been found to be useful at different stages of SMEs' innovation process.

9.3.1 Design as a creative tool for opportunities and benefits identification

The traditional interpretation of design creativity and imagination is in making products look nice and different. This is mainly from the ability of design to look for possibilities that may have not been explored before. Transferring this capability in the business context means not only focusing on the product but the entire innovation process, especially early stages where identifying business opportunities as an entrepreneur is critical. Scanning of the external environment requires some creative intelligence. Even though business tools are still needed for this process, a design attitude is needed to provide a unique mind-set to problem solving. The idea behind business innovation is to have customers who can buy and use the offering. This attitude aims to make the world a better place and using it in manufacturing SMEs to identify PSS opportunities is critical to instil the ability to think differently.

From the findings of the workshops, whenever designers mentioned users, this ignited interest and attention of SMEs and became the point of departure for negotiations of PSS innovations. Use of a business tool PESTEL to analyse the external environment, and SWOT to analyse the internal environment impacting on participant SMEs by designers proved very beneficial in identifying sustainability and PSS opportunities for each SME. This approach was from the point of view of user-centred design, further supporting Boland and Collopy (2004) with their view on the value of design attitude in driving profitability and human satisfaction. In addition designers saw investigating user needs as a niche for design that can be used to win SMEs' buy-in for PSS innovations. In SMEs, this would need to be systematised to allow repeated practice leading to maturity into a capability.

9.3.2 Design as an engaging activity and diffuser for exploration and education

If PSS adoption is to be driven by design rather than being adopted from legislative push, then there is need to cultivate engagement with designers. The co-creation of PSS also requires that potential adopters possess co-creation capabilities, which can be absorbed from co design. Co design in SMEs however, seems to be difficult as a result of limited in-house resources, expertise and general fear among SMEs to

work with external people (see also 6.3.3). Despite these difficulties, for PSS to be a success in SMEs, an engaging approach aimed at developing PSS mind-set and possibilities needs to be nurtured. The focus in this engagement should be to demonstrate value of PSS in a profit oriented setting. Bringing in designers as co-creators would need to be justified by demonstrating the impact it can bring to SMEs through significant improvements in decisions concerning materials; design of the physical product; niche of the service component and overall company image. This means crucial selection of development tools is vital not to scare SMEs away and view PSS as complex and impractical. Decisions over tools to be used should be tied to SMEs' maturity and ability to grasp knowledge-oriented issues. An appreciation of SMEs level of training and flexibility in learning and absorbing new knowledge will be critical.

The act of engagement of SMEs with designers should be an informal educative process for SMEs to learn PSS development processes and its value to the company and value to stakeholders. This should offer better alternatives to existing company approaches which presently view the external environment as buyers only rather than as co-creators of value. The significant impact to be made through this engagement will depend on designers' ability to build confidence in SMEs about their involvement with their businesses. This sense of ownership of companies by designers has been demonstrated by designers involved in workshops. Turning points for this engagement have been demonstrated to be breaking SMEs passive approach to business and novelty; infusing growth possibilities in non-product terms; and showing the business as usual minds the other side of the bar (see also section 8.4.2).

9.3.3   Design as a strategy and reward for consolidation and delivery

There is a traceable path in the growing value of design from design as a creative tool for opportunity identification through design as an engaging activity to design as a strategy and reward. Although the use of design across the three is still strategic and at leadership level rather than technical, an evolving approach to strategy development can be demonstrated through this path. This path has been demonstrated through a comparison of findings from all SMEs who took part in the

workshops presented in chapter 8. The use of design creativity at early stages not only shows companies opportunities and areas of benefit but also prepares them with attention to a required roadmap and resources. These begin to emerge as the companies engage with designers in developing PSS possibilities, showing areas of advantage and disadvantage in the company. The impact of this process on the company becomes clear as to which processes need synchronisation; which tools need more attention and which skills need to be further rehearsed.

Further, the capacity to define value of PSS to stakeholders; company resources; financial success and unique company capabilities also begins to develop, enabling the companies to see a direction and form of potential PSS offerings. Design as a strategy and reward for consolidation and delivery is therefore a key capability. PSS concept generation tools and methods to develop offerings; a design capabilities-oriented balanced scorecard to define value of PSS; and evaluative tools like the adequacy sheet are all important contributions. Evidence of use of these tools in support of this capability has been demonstrated in section 8.4.4. The key focus was not on competency in use of tools but transfer of design's creative intelligence described in 9.3.1 into interpreting and coordinating key areas of focus defining the company as a PSS provider.

9.4 SMEs with little or no design knowledge can adopt PSS

Evidence from observations made in each individual workshop and comparison of workshop findings suggests that SMEs hold different views, motivations and starting points to adopt PSS. While some look at it as a way of strengthening their once existing B2B and B2C transactions and relationships, others see it as a way of increasing access for their products and a sophisticated way of increasing sales in up markets. These three different views however, still had something in common; the impact design will need to make both on the physical product and the service component. There is also a direct correlation between these perspectives and the companies' maturity in terms of design and its interest in sustainability. This correlation has been elaborated in section 8.4.6.

9.5 Competitiveness and entrepreneurship development can be driven by sustainability targets

Some important findings from this research concerned issues of market performance of SMEs and sustainability. In addition to being affected by cheap imports from Asia, most SMEs who took part in the case study appeared to have been affected also by their complacency and poor brand awareness (see also 6.3.1). While cheap imports from Asia may be difficult to match through traditional manufacturing due to high manufacturing costs in Botswana, complacency could be addressed through fostering innovation in SMEs. This could improve brand awareness as offerings from each SME begin to have different identities. Although the issue of competition and innovation has also been identified in entrepreneurship development approach of the local support network (LEA, 2007), there is no clear strategy of how these could be addressed. This type of support in LEA also marginalises micro SMEs who are referred to as social enterprises.

According to Gray (2006) competition, innovation and reputation are among some of the reasons why businesses get interested in triple bottom line. These reasons are in agreement with the findings reported in 6.3.1 affecting market performance of SMEs. In addition to this congruency, the motivation for almost all SMEs who participated in the case study to engage in sustainability was economic as reported in 6.3.5.2. This has also been a view held by Maxwell and van der Vorst (2004) who argued that social and environmental sustainability were the motivation for sustainability in developed countries as opposed to economic sustainability in emerging economies. The SMEs positive perception of sustainability and their embracement of sustainability practices like remanufacturing, recycling and reuse of cut-off materials (see also 6.3.5.1) could be practical targets to drive their competitiveness and general development of their enterprises as innovation activities are centred on these sustainability initiatives. This approach could address SMEs' economic sustainability concern at the same building environmental and social sustainability.

9.6 Support intermediaries can promote **SME** competitiveness through sustainable **PSS**

The relationship between SMEs and government through the support network administered by the government agency (Local Enterprise Authority (LEA)), showed a lot of potential in supporting sustainability and PSS initiatives. All SMEs who took part in this research are members of the support network and benefit from various programmes. This relationship has been ranked in the Delphi study among high priorities in strategies for achieving of PSS as a competitive strategy for SMEs in Botswana. In Klewitz and Hansen's framework of sustainability oriented innovation (2011), such relationships have been categorised as mechanisms of influence, with such potential as fostering sustainable business models and process and product innovations. These mechanisms of influence provide an important link between knowledge transmitters and other value chain partners with SMEs. This approach has been used largely to promote sustainable design practice in SMEs in the UK (O'Connor and Cox, 2005). An extension of this role to sustainable PSS support needs definition of a path defining the stake of support intermediaries.

From this research, it could be proposed, supported by findings in chapters, 6, 7 and 8 that the role of the support intermediaries could be at three levels; infrastructural, institutional and in facilitating interactions and networking for member SMEs. This position is in line with the systems failure rationale suggested by O'Rafferty et al (2009) suggesting that it makes provision for addressing infrastructural and institutional deficiencies for ecodesign interventions. In this research, the role of support intermediaries like government institutions was seen to be key in facilitating SMEs' innovation activities through provision of necessary support interventions for SMEs under their custody. This followed the development of the systems success framework developed in chapter 6, which was primarily used to drive the design of protocol for workshops reported in chapter 8. An example of this facilitative approach has been shown in section 6.3.3.4, where government has provided financial support for SMEs on subsidy schemes of 85% to 15% for SMEs' training needs on development of their business. This is an example of an infrastructural support and it comes early as it provides for basic skills needed in business development.

Through this vein, SMEs' problems associated with design reported in section 6.3.2 and further substantiated in 6.4 to 6.6 demonstrated an infrastructural deficiency which can be combated through collaborations with designers. The informal business structure of SMEs, lack of strategy and their financial constraints would impair them to handle these collaborations. In this case support intermediaries can operate as a hub of these collaborations by sourcing and supplying designers and other infrastructural needs. This may be a situation that requires prioritization between setting up infrastructural provisions and providing a supportive environment for collaborators involved. The LEA already has similar institutional provisions as discussed in 7.2.3, which can be translated into the context of supporting SMEs towards sustainable PSS. The role of intermediaries in light of designers as valuable partners for informally dispersing design capabilities has been summarised in Figure 9-1.
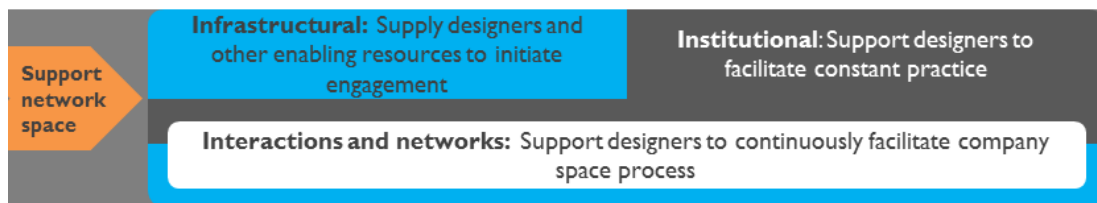
Figure 9-1: The role of support intermediaries

9.7 SMEs can be engaged to develop a competitive and sustainable PSS strategy

The workshops undertaken with SMEs were found to be instrumental in developing a shift process to engage SMEs with sustainability and PSS. Analysis of workshop data yielded twenty factors grouped under six categories discussed in Chapter 8. The relationship between these categories has shown a subsequent progression from one category to the other, and other intermittent links providing the basis for shift process with feedback loops as shown in Figure 9-2. This thesis has explored a contextually appropriate approach for manufacturing SMEs in Botswana to address their competitiveness needs through a shift to sustainable product service system supported by developing design capabilities. The engagement of SME participants with designers in interactive workshops has demonstrated and identified factors

that can contribute to this shift. These factors have contributed to the Design Capabilities for Product Service Systems (DeCap PSS) process shown in Figure 9-2.

Factors contributing as stages of the DeCap PSS process are (1) Identify value to initiate engagement, (2) Build Understanding, (3) Reflect on familiar experiences, (4) Empower and coordinate, (5) Define outlook of organisation, (6) Propose added advantage. The first three stages are primarily concerned with developing design creativity and the later design strategy over a trajectory that involves design as an engaging activity that connects creativity to strategy. These capabilities have been discussed in section 9.3. Similarities can be drawn between the six stages of the DeCap PSS process and stages of the process of changing an organisation into a PSS provider proposed by De Lille et al (2012). In both cases, emphasis is on a balance between understanding business thinking to understand the organisation so that there is a way of manoeuvring PSS ideas towards implementation and design capabilities to support innovation and changes from product to service orientation. The DeCap PSS process is discussed and compared to De Lille et al's process of (1) understand, (2) Focus, (3) Insight, (4) Design, (5) Implement, and (6) Consolidate.
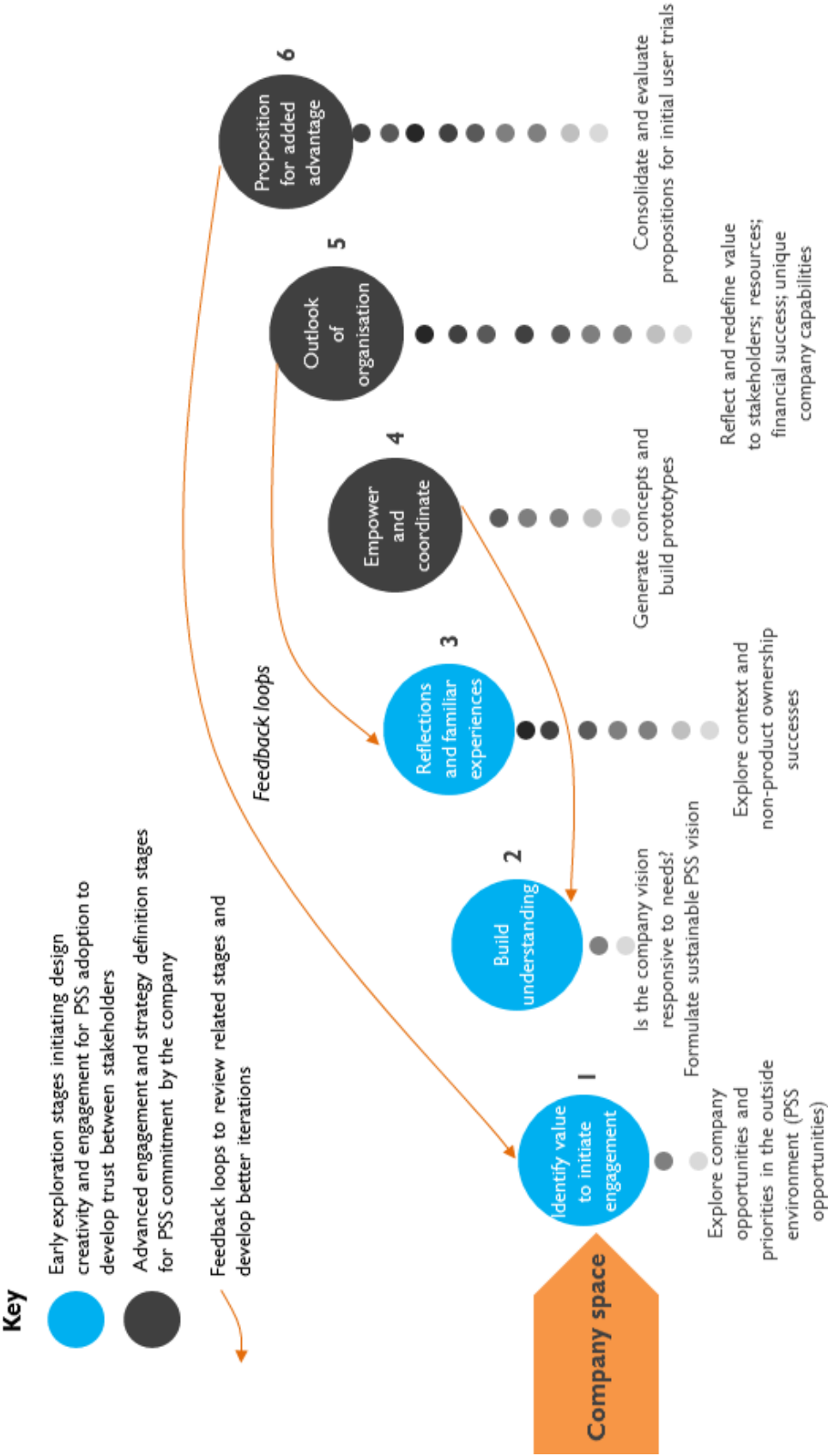
Figure 9-2: Design Capabilities for Product Service Systems process

9.7.1 Identify value to initiate engagement

The first stage addresses exploration of company opportunities and priorities in the outside environment and how the company can benefit from design. The aim is to prompt SMEs engage with sustainable PSS with a designer's eye. The external environment should therefore be scanned for ideas with long term benefit to combat the current problem of offerings targeted at quick financial gains with no long term value. The essence of design adds value within the company through issues of identifying user needs and exploring opportunities for product ownerless offerings over product ownership offerings. Identifying users and their needs will help define the market potential of the PSS idea early. The significance of this stage has been demonstrated in sections 8.1.5.1, 8.1.5.4 and 8.4.1. Where an internal or external factor has been identified as very valuable by the company, designers should begin their exploration with it to begin the bargaining process with the company.

9.7.2 Build understanding

This phase is the extension of the situational analysis stage in 9.7.1, but now more focused. New opportunities identified may contradict the traditionally product oriented company vision. Using key opportunities or prompts identified, designers should now engage SMEs in co-design activities to redefine company visions or focus in a PSS direction through breaking SME passivity (critiquing each other and introduction to design communication and exploration tools), infusing growth possibilities (expanding prompts identified earlier beyond preliminary understanding of SMEs) and offering a balance to the dominant, but sometimes less informative, business perspective (deploying emphatic techniques to minimise resistance of PSS opportunities by SMEs and offer business development alternatives). This approach builds familiarity with design for SMEs and how it can contribute in building a sustainable mind-set through PSS and existing company capabilities (see also 8.4.2).

9.7.3 Reflect on familiar experiences

This stage focuses on exploring non-product ownership successes in the context SMEs operate, as an inspiration towards service offerings and a sustainability orientation in a manufacturing company. Giving examples of successful PSS ideas

251

already commercial both in the service industry and manufacturing industry will show the reality of the concept. With more ideas still from big companies, and even fewer in developing contexts, digesting them down to SMEs level of understanding is critical. A database of these successful examples should be built throughout the process to aid adaptability and identification of success factors (see also section 8.4.3).

9.7.4   Empower and coordinate

After identifying opportunities, crafting a vision and assimilating experiences from successful PSS solutions, prototyping should begin. A development process should now be defined for the company to empower them generate solutions. More relevant and applicable tools to the company in question should be identified and deployed across the entire process to guide logical and systematic solution development. In this stage designers should iteratively emphasise developing such capabilities as sketching, prototyping, working iteratively, and sustainability and viability decisions to instil confidence in SMEs expressing their ideas and shaping their companies. Emphasis on tool and process is a bargaining approach towards sustainable PSS solutions which designers should continue to coordinate as collaborators (see 8.4.4). This stage should continuously reflect visions defined in stage two and where appropriate make modifications.

9.7.5   Define outlook of organisation

An understanding of what resources should be committed, existing and non-existing, and how much of them are required would already be built from the previous four stages. The impact of a sustainable PSS offering on other company resources not directly related to the solution but to its market success and to the outlook of the company as a PSS provider should also have been understood from previous stages. Defining resources and their value, identifying stakeholders and their roles, and building brand equity are key strategic issues which should be addressed at this stage. Other resources to be mobilised should be defined in order to allow coming up with strategies to take the idea forward, based on what is feasible and commercially viable (see also sections 8.1.5.4 and 8.4.5). This stage

should reflect on stage three to ensure best practice strategic examples have been adapted from successful existing PSS providers.

9.7.6 Propose added advantage

A possible solution or a mix of solutions in their entirety should be defined in terms of commercial viability, value to stakeholders, innovativeness of the solution and its sustainability consideration like longer life cycles, less material intensity, use of environmentally friendly materials, sustainable consumption behaviour patterns in consumers and its efficiency. High priority benefits for each company should be given more emphasis and refined and consolidated to get the offering ready for initial implementation trials. A link between low priority benefits supporting viability of the proposition and its success should be drawn so that they are not underestimated or left out. These should also be reflected on the basis of value identified as opportunities in stage one, so that further improvements can be made.

In their study of a designerly approach to delivering product service systems, De Lille et al (2012) identify the first three stages of their process (understand, focus and insights) as focused on building a design mind-set, which enables the last three stages of design, implement and consolidate. In the DeCap PSS process the first three stages are also targeted to do the same through transfer of design creativity in the business context as designers interact with SMEs through use of business tools (see section 9.3.1) and engaging SMEs through co-design activities in an exploratory and educative approach (see 9.3.2). There is a slight variation in the last three stages between the DeCap PSS process and De Lille et al's. Although their implementation stage has got similarities with the empower and coordinate stage through its emphasis on wins to convince and strengthen the organisation, it does not define a path towards strategy development to ensure repetition and transferability in future scenarios. However, strategic issues like KPIs have been vaguely mentioned.

Emphasis of the DeCap PSS process towards strategy development is key to SMEs' competitiveness as lack of strategy has been mentioned as barrier both as a general problem for SMEs (Temtime, 2008) and for PSS adoption (Hernandez-Pardo, 2012). Although Finkel et al (2013) were not addressing the shift towards product service

253

systems but the development process, their four phases of analyse, define, conceptualise and evaluate can be compared with the DeCap PSS process, with strategic issues identified throughout the process. Finkel et al do not focus on developing capabilities but mention in their first stage, the need to identify the PSS provider's own capabilities relevant to solving the need.

9.8 The practical value of building design capabilities for PSS adoption

Although design and PSS tools were not the primary focus in this research, an appreciation of what already exists was gained through review of literature on design capabilities and PSS methodologies. This provided grounds to make methodological decisions of tools to use with SMEs involved in the workshops. Interactions with these SMEs during the case study also helped appreciate how SMEs were doing things. These have led to suggestion of possible tools that can be effectively used at each stage to support the shift process. Use of tools in this research was line with the argument that capabilities develop through use of relevant tools (Acklin, 2013; Mozota, 2006). The evolvement of the DeCap PSS process is also viewed as an improvement approach for competitiveness. For this reason, tools suggested are mostly improvement tools rather than assessment tools. Moreover, these improvement tools were also found to be easy to use by SMEs because of their qualitative nature. Details about how tools added value in each SMEs can be seen in chapter 8. Tools make the process tangible and show its relevance in supporting innovation activities from need identification to value proposition as summarised in Figure 9-3.

254
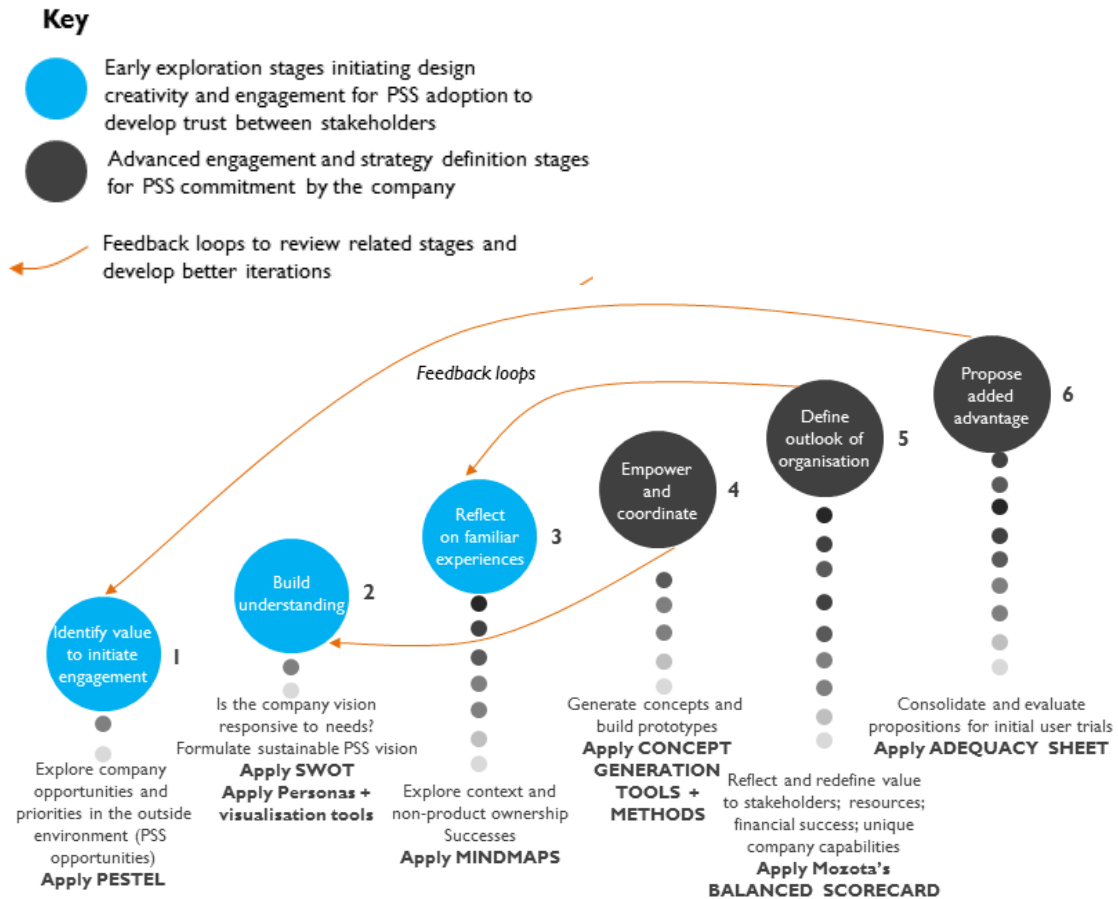
Figure 9-3: Possible tools for use in the DeCap PSS process

Figure 9.3 shows the process and suggested tools to be used directly by SMEs and designers in a value co-creation setting as informed by exploratory workshops discussed in chapter 8. It is also important to note that this engagement is supported by support intermediaries creating a conducive environment as discussed in section 9.6.

In the first stage of the process (Identity value to initiate engagement), SMEs and designers perform a PESTEL analysis to scan the external environment for service opportunities in existing or new markets. The role of design at this stage is to influence the analysis through user needs identification perspectives. The outcomes of this process should be a service oriented ideas.

In the second stage (Build understanding) service opportunities identified in stage 1 are used to reflect on the existing company vision. The responsiveness of the existing company vision is interrogated in light of new needs identified and this

process is supported by performing a SWOT analysis. During the process design offers use of User Centred Design tools like personas to clarify who users are in order to define the market for the new company vision. Visualisation tools like persona templates and brainstorming on sticky notes are used. Design also offers the perspective of sustainable design to service opportunities to ensure a sustainable PSS is conceived from the onset. The outcomes of this process are sustainable PSS oriented company vision and potential service idea for a new or existing product in the company.

In the third stage (Reflect on familiar experiences), the context is explored in terms existing successful service offerings and other non-product ownership successes. This is supported by using mind mapping as used by designers in exploration of concepts to draw inspirations from successful sustainable service offerings that exist both from the local service industry and other PSS offering from other contexts. The outcomes of this stage are potential sustainable PSS idea(s) with a defined market and refined product idea that can support the service.

In stage 4 (Empower and coordinate), concepts around this PSS idea(s) are explored as prototypes varying from low fidelity customer journey maps and mock-ups to concepts that can be tested with real users. Here design provides concept generation/prototyping tools like customer journey maps, process for concept generation and selection and visual communication tools like sketching, mind mapping. The outcomes of this stage should be promising PSS solutions for the company. These should be checked against the new vision defined on second stage and iteratively amended if need be.

In stage 5 (Define outlook of organisation), the promising PSS concepts are further filtered in terms of value to stakeholders and resource commitment required by each of them. The impact of the ideas is measured by a design based balanced scorecard to demonstrate advantage of a solution over the other. Outcomes of this stage are a detailed PSS solution with a unique value proposition demonstrating how the company has applied its unique resources to create competitive heterogeneity. The new outlook of the organisation should be checked against inspirational cases

explored in stage three to ensure there is some superiority or value added to existing concepts in terms of sustainability, strategy and profits.

In stage 6 (Propose added advantage), the solution described in stage 5 is further consolidated and refined for initial user trials. A PSS adequacy sheet is used to evaluate the solution to reflect areas that need further attention. If the solution does not offer the best alternative to meeting user needs and addressing sustainable business development, the process should be repeated from stage one to identify areas of improvement.

9.8.1 Usability and transferability of the process

The DeCap PSS process that evolved during this discussion and derived from studies conducted in this research provide a description of stages that SMEs in the leather manufacturing industry can go through to improve their competitiveness towards the shift to sustainable PSS supported by developing relevant design capabilities.

The key emphasis of the process in aiding effective shift towards differentiation and competitiveness through PSS offerings is in design leadership to ensure that ultimately SMEs have a sound business strategy. This early version of the process is a good starting point for SMEs in the leather industry to build a positive mind-set about PSS in order for them to explore its benefits. The fully inquiry-packed stages provide a platform to engage SMEs in a rigorous process of exploration and quest for novelty through design capabilities, hence the reason to develop creative potential of SMEs early. Even though traditional business tools have been used in most stages of the process, their use through a sustainable design mind set is the turning point in this process. This combination has not been evident in the literature reviewed.

Although this has been developed with SMEs in the leather industry in Botswana, this is a good starting point for SMEs in other industries, even in other developing countries. The non-competitiveness of traditional product manufacturing SMEs in these contexts should be able to be investigated and explored through innovative a

257

design led non-product based strategy proposed by this process. This exploration can allow SMEs build a positive mind set about sustainability and product service system and have the zeal to drive their businesses in this direction.

For support intermediaries, this process is an opportunity to enhance their efforts towards building competitive SMEs. An example of the support intermediary described in chapter 7 for example, can apply this process into their entrepreneurship development category and run it as a programme for a number of years. This is especially relevant for this support intermediary who through their incubation programme can be able to measure the effectiveness of this process when adopted as a programme.

9.8.2   Limitations of the process

Although a possible path towards building competitiveness in traditionally product oriented SMEs through PSS is presented as supported by the value of building relevant design leadership capabilities, a checklist approach through the stages of the process may be inevitably a false impression of an easy path towards differentiation. A repeated use of the process is necessary so that its routine use matures and reaches a threshold of practice. It is this threshold that would justify development of capabilities since companies would be able to measure progression and continuous improvement on their own, with little input from designers. Moreover, this process presents a simplified approach, especially with its suggested tools which are mostly qualitative. These qualitative tools may not give a good indication of improvements that may need to be quantified. The sustainability component also runs the risk of being undersubscribed due to its reliance on supply of sustainable designers by support intermediaries, which may lead to the rebound effect should this not be the case. Although the intention is to develop sustainable PSS offerings, the process does not guarantee that, rather that SMEs' interactions with sustainable designers should provide leads into how they can practice sustainable design of PSS.

10 Conclusions

In this chapter, conclusions are drawn from the experiences of this research project, demonstrating how the aim and objectives have been met. Contributions to knowledge are also discussed. The chapter concludes by discussing limitations of the research and areas for future research.

10.1   Meeting research aims and objectives

Most existing PSS tools and methodologies have been developed to support the design and development activities and do not explicitly outline the shift process, especially the need to develop capabilities that can support product oriented companies willing to compete as PSS providers. These approaches also appear to be context specific and have largely been developed for use by big companies in developed nations. PSS research on SMEs is still up-coming in both developed and developing nations. The challenge in this thesis has been aimed at exploring effective and contextually appropriate means through which manufacturing SMEs can address their competitiveness needs through developing design capabilities to support sustainable Product Service Systems adoption.

The first part of the aim concerning contextual approaches and competitiveness, has been addressed through the selection of SMEs in the context of Botswana and more specifically through a set of priorities for SMES in Botswana produced through a Delphi study. These priorities related to understanding context, design thinking, systems thinking and sustainability practices. The thematic areas for the priorities formed the basis for developing any intervention that was more likely to be successfully adopted by SMEs and their stakeholders. These were translated in a novel way into a systems success framework, showing the breadth and depth of factors to be addressed, should any intervention addressing competitiveness through PSS be successful.

The second part of the aim, dealing with developing design capabilities and competitiveness was addressed by proposing a process to building competitiveness capacity in SMEs by encouraging design innovation through building relevant design capabilities, instilling a positive mind-set in SMEs about differentiation through sustainable PSS offerings. The highlight in this process, of moving SMEs gradually to strategy development, has a great potential in embedding sustainability decisions at the heart of a PSS strategy, especially in resource constrained companies like SMEs.

10.1.1 Meeting the objectives

Objective 1 - To review of literature on business innovation in the context of sustainability; product service systems; organisational development view of competitiveness and competitive edge through design capabilities.

This objective was completed with a comprehensive literature review in Chapter 3. The review covered a blend of factors contributing to competitiveness in sustainable business innovation, with emphasis on product service systems and the importance of design capabilities in organisational development. The concept of competitiveness is explored as a PSS benefit, from management perspectives of the neo-classical micro economics view and resource-based view, leading to a connection between competitiveness and a capability based approach.

Objective 2 - To identify factors relevant for manufacturing SMEs in Botswana to explore sustainable PSS as a competitive business strategy.

In order to achieve this objective, a scoping study employing the Delphi technique was conducted, looking at the broad landscape of competitiveness of SMEs in Botswana and a place for sustainability in their business operations. The Delphi study was done with a homogeneous panel of 9 experts and the results have been presented in Chapter 5.

Objective 3 - To explore competitiveness experiences of leather manufacturing SMEs in Botswana and their perception of sustainability and product service systems.

260

This objective was achieved firstly by exploring underlying concerns regarding challenges and other experiences that lead to poor or good market performance of SMEs' products in the market. Secondly, SMEs' perceptions to move towards sustainable business practices, including being PSS providers were also explored. This exploration was done onsite, through a single case study approach with multiple embedded units of analysis with 18 SMEs in the leather industry in Botswana. The study has been reported in Chapter 6.

Objective 4 - To carry out an in-depth exploration of how SMEs can recognise and apply design capabilities to differentiate themselves by creating sustainable PSS offerings through interactions with sustainable designers.

This objective was met by conducting exploratory workshops involving designers with sustainable design and service design knowledge and SMEs in three different industries all in the leather industry. Three separate workshops were conducted with SMEs in the furniture, shoe and bag industries to explore and translate PSS opportunities into PSS propositions, through a learning curve of employing design capabilities. These workshops and findings have been reported in Chapters 7 and 8 respectively. From the analysis, six major themes emerged, whose relationships evolved into a potential to support differentiation in SMEs through a journey towards servitization supported by design capabilities.

10.2 Conclusions

Building competitiveness capacity in SMEs by differentiation through sustainable PSS supported by building design leadership capabilities became apparent during this research. A different perspective of organisational competitiveness has been identified in this research as one that promotes strategy development in traditionally product oriented SMEs by encouraging a shift towards sustainable PSS driven by developing design leadership capabilities. Understanding contextual priorities is key for this approach towards SMEs' competitiveness to be successful since a panoramic view of

the whole systemic elements that can foster success defines a point of departure. The Delphi study has been instrumental in identifying issues related to (1) Understanding the context of Botswana such as lack of self-drive and commitment to entrepreneurship by local SMEs, (2) Systems thinking such as providing clarity to essential communication networks and systems defining interactions between stakeholders, (3) Design thinking such as encouraging strategies to facilitate identification of outsourcing niches and product/service differentiation, and (4) Sustainability practices including exploring the use of locally available resources in developing PSS offerings.

These priorities have contributed to an exploration that led to elements of a systems success framework defining competitiveness issues affecting SMEs in the leather industry across systemic categories like infrastructure, institutions, interactions and networks, SME capacity and culture. This web of systems success highlight the significance of sustainability and an integrated approach to PSS development by bringing together among others infrastructural issues concerning design such as creating awareness of emerging design for sustainability trends, institutional issues concerning relationships such as developing structured and coordinated partnerships to engage designers, and SME capacity issues concerning PSS including exposing them to design tools and methods to aid PSS development. This systemic approach can promote development of a service oriented competitiveness strategy by SMEs with particular attention being paid to the significant role design capabilities can play in a traditionally product oriented non-design led organisation. The long term gains of sustainable PSS can then be realised as organisations become grounded in design leadership capabilities enhancing their ability to move to a more service oriented business practice.

Further conclusions from this research can be summarised as follows;

- Sustainable PSS in micro SMEs with no prior design knowledge is possible but initial investments in knowledge creation are significant. This challenge is an addition to already existing operational and strategic barriers that SMEs face

262

towards attaining competitive edge. However, in this rapidly dynamic and globalised economy, economically successful organisations make significant investments towards knowledge creation. This thesis proposes a way of developing design leadership capabilities to nudge SMEs towards service differentiation.

- Although SMEs involved in the case study showed positive perceptions of sustainability and product service systems, their understanding of sustainability is still limited to economic sustainability. This has made other gains of sustainability like environmental and social low priorities for SMEs, whose motivation to move to sustainability were purely economic. This economic drive in SMEs is also propelled by major challenges primarily including lack of finance and poor market performance of products contributing to enormous low profit margins. The desire to push for more sales still remains the driver for SMEs to adopt interventions in which they see that potential. For SMEs to embrace other sustainability pillars, it is important that interventions demonstrate environmental and social sustainability practices with financial gains. For SMEs involved in this study, voluntary product take back was embraced for its potential to reduce the need for virgin material, hence reduction in related costs.

- SMEs are not used to working with external people and achievements are limited by doubt in doing what has not been done before and their autonomy in final decisions. This autonomy is a barrier where more design informed decisions need to be made since SMEs still lack that design experience. Moreover, this collaborative arrangement will need to overcome fears concerning lack of trust from similar previous arrangements with other SMEs, lest salt is added to healing wounds that may result in fatality of collaborative cultures in SMEs. A precaution has been taken in the DeCap PSS process where support intermediaries facilitate and coordinate transactions between SMEs and

263

other stakeholders (in this case designers), to protect the relationship from trust concerns as reported in chapter 6.

- Design leadership capabilities innovatively deploy other design capabilities across the entire process as a way of bargaining for use of design by SMEs in their entire development processes. A design capability recognised early by SMEs is the ability to investigate user needs. Its recognition has demonstrated that design can make a significant contribution in mind-set change of SMEs towards servitization.

- The systems success framework is a new radical proposition for competitiveness within PSS and design capacity issues for SMEs, and offers suggestions on addressing fundamental competitiveness concerns of SMEs, especially through design, sustainability and product service systems across the whole systems landscape. This approach ensures reduction of chances for failure of any intervention that seeks to address these concerns.

- The DeCap PSS process is an example of an intervention developed following the systems success framework. Effective examples of translating this framework into a usable intervention are the creative workshops conducted with SMEs in the furniture, bag and shoe industries; which led to the DeCap PSS process. During these workshops, a collaborative environment was created between designers and SMEs owners/managers, hosted by the facilitator who mainly played the role of a support intermediary first by supplying designers and secondly by facilitating and coordinating activities between the two camps. The workshops brought the design and business perspective around the table to establish common interpretations of what opportunities are (user needs), how to identify them and to meet them through service oriented offerings that promote sustainable business operations.

- The flexibility of designers working styles and their adaptability to different situations, especially to use design capabilities in non-design led product oriented companies to instil radical innovation concepts like sustainable PSS has been demonstrated in this research. The key to competitiveness is in identifying a niche and exploring it further into a possible commercially viable product. A design attitude has shown that it is possible for SMEs to propose innovative ideas in their market when using design capabilities.

- Highlighting key design leadership capabilities that should be developed throughout the process is crucial and effective in engaging SMEs through a structured approach to build this design attitude in them and the design instinct to respond to their immediate environment and future scenarios.

- Tools suggested to be used in the DeCap PSS process are largely qualitative to make the concept attractive and relatively easy for SMEs, whose educational background in many cases in developing countries is very basic.

In conclusion, the empirical work done in this research has allowed understanding of fundamental issues to be considered in a developing context when a sustainable PSS strategy is to be considered. This research stimulates dialogue about perspectives of addressing competiveness of SMEs in a developing context, in this era of servitization of manufacturing. The role of design in this context has also been shown to span to effectively addressing how SMEs can incorporate sustainability issues. Using designers with sustainable design knowledge could promote principles of eco design, dematerialisation and life cycle thinking principles. Finally, it can be concluded that design can be used as a strategy through its capabilities to promote a culture of radical innovation in SMEs and adoption of sustainability. The catalytic advantage of design used in this manner lies on its flexibility to relate to the technical language of innovation and the non-technical language of business. However, caution is taken in this regard to use design as panacea as other business development considerations still need to be

addressed. General conclusions from findings of this research project have been briefly summarised in Table 10-1.

Table 10-1: General conclusions

Study	General conclusions
Delphi study	Contextual priorities for developing business strategy are systemic in nature even in the case of SMEs. The main conclusions from this Delphi have been the four themes of understanding the context, systems thinking, design thinking and sustainability practices
Single case study	The need to develop dynamic capabilities to support innovation and reduce follower mentality and complacency in SMEs has been demonstrated by low competitiveness performance reported through various themes in chapter 6. A proposition to address the problems through sustainable design and PSS has also shown that systemic considerations are key to design out failure.
Systems Success Framework (SSF)	A structured interpretation of factors to address in developing PSS strategies for competitiveness in SMEs, using sustainable design as the leader. The systemic nature of this framework makes provision for avoiding the rebound effect and designing out unsustainability in PSS solutions.
Workshops	The need to create rigorous awareness of design to build PSS competitiveness potential and promote the ability to look at long term benefits could benefit more from formalising SMEs design process through informal settings of projects with designers. Spotting business opportunities and developing a sustainable way of meeting user needs can also be enhanced by design exploration in entrepreneurs.
The DeCap PSS Process	A possibility to initiate mind-set change and begin the shift process to PSS in SMEs can be explored through the DeCap PSS process. Repeated exposure to the process could create room for SMEs to customise the manner in which they develop dynamic capabilities to support servitization.

10.3   Contribution to knowledge

Contributions to knowledge accomplished in this research can be looked at in terms of PSS and organisational development in order to demonstrate the value of this research to PSS competitiveness in SMEs. The main contribution to knowledge in terms of sustainable PSS is a new design influenced approach of defining success towards competitiveness. This has been proposed through the Systems Success Framework.

266

Competitiveness issues spread across systemic categories for capacity development in SMEs, namely infrastructure, institutions, interactions and networks, SME capacity and culture, provide reference point for building resilient PSS systemic innovations. The Systems Success Factors signify key issues that should be addressed in a systemic context. Each factor comprises of various issues that need to be identified per context of use as has been demonstrated in the context of Botswana. The value of this framework is in light of its capacity development core that provides a platform to build a new generation of SMEs adaptable to the growing service economy discussed in section 9.2.1. This framework can also be complimentary to PSS literature often flagging competitiveness as one of the key benefits even for SMEs. A systemic view of this benefit through this framework can allow exploration and definition of competitive sustainable PSS leading to design and development of PSS offerings.

In terms of organisational development, one contribution made relating to entrepreneurship development and innovation, has been in terms of using design in a non-traditional sense to encourage Product Service Systems innovation in non-design led SME organisations. While it is true that giving SMEs with no prior design knowledge exposure to design tools and methods can inculcate design capabilities in them, it is not obviously so in terms of using design in the PSS innovation process. Integrating design capabilities in the PSS innovation process is key to avoiding repetition of competitiveness concerns explored during this research. A quick example of these problems is copying successful products in the market leading to splitting the market share and low profits. In most cases these products have also looked inferior to existing ones, since the copier lacked some capabilities supporting development of that product; largely characterised by lack of an innovation process or a skipped process starting from copying, tracing templates to manufacturing.

For competitiveness strategy development in non-design led companies, the research has identified use of design leadership capabilities in an evolving way that lead to a strategy emerging during the DeCap PSS process. Capabilities supporting strategy development have been found to be overlapping from design as a creative tool for

opportunity and benefits identification, design as an engaging activity and diffuser for exploration and education, to design as a strategy and reward for consolidation and delivery. The last capability has also been reinforced by suggested use of a design-inclined balanced scorecard at the strategy definition stage (define outlook of organisation) of the DeCap PSS process. This shows a strong link between these design capabilities and emergence of key strategic areas to be addressed in a PSS competitiveness strategy.

A trajectory of developing design capabilities for PSS has been defined in this research as the DeCap PSS process. This is a significant contribution for academia, research and practice. A complex web of knowledge concerning organisational competitiveness, design and sustainable PSS has been unpacked into a six stage process. This process can be used as a basis of discussions concerning PSS in non-design led small companies by academics and researchers. It can also be empirically tested further in varying contexts by both researchers and practitioners to test its underlying assumptions and principles. Furthermore, practitioners can use this process at early stages of starting to engage with PSS, where more design and sustainable design guidance will be instrumental. Stages of this process have adopted reflective and iterative principles of most product development processes, though at a high systemic level.

10.4 Limitations of the research

The ideal situation for conducting this research, largely dealing with competitiveness of non-design led SMEs, would have been a more action research, until substantial repetitions of tasks become a routine that can be termed a capability for supporting competitiveness. Outcomes of the exploratory workshops should therefore be treated as under-rehearsed and needing refining. This can be achieved if more workshops of this nature were conducted with more SMEs, using one of their current projects to allow the effectiveness of the workshops at the end of the project to be measured. The short time frame allowed for this research project therefore influenced difficult methodological decisions, aggravated by the distance between the researcher and participating SMEs. The researcher was based in the United Kingdom and participants

in Botswana. Although three studies were conducted, the distance involved meant that the choice of methodology enabled the collection of different forms of data at the same time. It would have been interesting to see how these SMEs change over time through constant interactions, especially through more workshops exploring their already on-going commercially viable projects. However, getting time synchronisation between project stages and research stages from a distance would have been unachievable.

Limited funding available for the project also meant that only eighteen of these companies could be visited and later even a smaller number involved in exploratory workshops. Despite the distance demands for the researcher from the UK to Botswana, these SMEs are also geographically dispersed throughout Botswana. This meant that only regions where there was a better concentration of these companies were visited, and even fewer involved in the workshops, all of which were based in one city.

The funding and time issue also affected sample type. Stratification of the sample across SMEs in at least two industries of leather and textiles was desirable to allow more generalisations of results to other industries. Use of only the leather industry, further bound to a specific context means that the outcomes of this research should only be transferred to other contexts and industries with caution, since no testing has not yet been done other than in the context of this research.

10.5   Recommendations for further work

The crux of this research has been to understand then propose, through an exploratory approach, a competitiveness systems success framework and a Design Capabilities for Product Service Systems (DeCap PSS) process for non-design led SMEs. The framework and the process allow a design led exploration of SMEs' innovation process to identify competitiveness niches that can benefit from a sustainable PSS strategy. These outcomes therefore present a number of possibilities for future work.

Although the outcomes of this research are based on the Leather industry, lessons learnt from this research could be applied to other SME industries, more so that general operational and strategic challenges of SMEs including competitiveness concerns of their managers appear to be the same. Outcomes of this research can therefore stimulate research projects on other SME industries and be treated as a potential starting point. Although an all-inclusive intervention for all industries is almost improbable, similarities across them are likely to give informative leads that can even demonstrate potential areas of cross collaboratory PSS development work.

All SMEs who participated in this research are members of a support network statutory mandated to development of SMEs as a possibility to economic diversification. The network runs a three year incubation programme for qualifying SMEs. Another area of further research would therefore be to develop the process further into a programme that can be used as part of the incubation programme, targeted at SMEs willing to compete through PSS. This would help to encourage companies to set up as PSS providers at the end of the incubation programme, reducing or eliminating the need of the often required retrofitting. An invitation to submit a proposal has already been made by the support network working with SMEs in Botswana, which will show how the programme could be of benefit to SMEs in Botswana. Experiences gained through this research, both from literature and field work already avails rich data that could inform further development of the process at practical level. The data could also contribute to building an inspirational repository of knowledge for SMEs to provide a quick reference point every now and then.

Observing upcoming research trends on design and PSS in developing countries would be an invaluable source of insights to keep reflecting and updating the proposed framework and process. It is therefore important to keep building and developing better understanding of different and more effective ways in which PSS could be more established in developing contexts.

Another area of further research concerns the perspectives of potential users. In this research, the focus was more on SMEs as potential providers. The decision making of consumers as to own or not to own a product in these contexts and how they could participate in value co-creation needs to be tapped into.

Finally, to reiterate one conclusion concerning design leadership as key to moving SMEs towards PSS it is important to look at the entire innovation process. However, it is at early stages where companies make decisions of whether to manufacture a product to sell for ownership or not. This depends on the gap they may have identified in the market. It is therefore key to develop design leadership capabilities deployed with a deliberate intention to explore PSS opportunities early. This will encourage a product ownerless culture among consumers, leading to a more dematerialised society, and uprooting of more sustainable consumption patterns in the case of sustainable PSS, where a whole life cycle approach employing such strategies as product take back is adopted.

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APPENDIX A: ROUND ONE DELPHI CONSULTATION

Round One Delphi Consultation

Protocol and Notes for Participants

1. About SMEs and Product Service Systems

This Delphi consultation is part of the on-going research on how manufacturing SMEs in Botswana can be supported via a support network to adopt Product Service Systems as their competitive business strategy. The ideal situation would have been to look at as many industries as possible. Due to time constraints and resources within which this research has to be done only the Leather and Textile industries will be used in this investigation.

The aim of the research is to identify effective ways through which SMEs in Botswana can be supported to 'leapfrog' to sustainability through Product Service Systems (PSS) as their competitive business strategy. The purpose of this Delphi survey is to primarily focus on developing priorities a strategy for transforming manufacturing SMEs into service companies should address as well as factors that can be used by SMEs in Botswana as competitiveness niches.

2. About the Delphi Technique

The Delphi technique will involve various people from diverse social and professional stratums as academics, business community, government and research institutions to build a consensus towards addressing the primary purpose of this Delphi consultation exercise stated above. Expertise from participants cover a range of knowledge and skills from research on global competitiveness, SME competitiveness and their problems, policy formulation and trade issues, manufacturing dynamics, eco design, sustainable design and product service systems. Focusing on Leather and textile industries we are consulting with key stakeholders about what could be done to offer support for manufacturing SMEs in Botswana in the transition towards service providing companies as a competitive strategy taking advantage of their manufacturing base.

The Delphi is a reputable research methodology to transform expert opinions into a valuable consensus. The process particularly benefits from the fact that there are no identifiers used to tag who made which comments. Views are collected and distilled anonymously with constant feedback throughout the process. The in-depth qualitative views of experts can then be analysed quantitatively towards building a consensus as the panel agrees on priorities. This Delphi exercise will involve three rounds of consultation with identified experts.

In Round One a short list of modified open ended questions will be sent to experts to gain their views on issues relevant to SMEs competitiveness, servitization strategy and potential support given to SMEs. The responses will be analysed and summarised as feedback to the panel anonymously in Round Two for further comment. Using a rating scale, experts will be asked to rank in order of importance issues identified in Round One. The results will be analysed and circulated back to the panel again in Round Three where areas of consensus among experts as top priorities will be identified and confirmed with them.

3. About your contribution

Participation in this Delphi exercise will involve giving us the benefit of your expertise by taking part in each of the Delphi exercise rounds. This will involve completing three questionnaires, sent to you within a period of two months.

The questions in the first round will ask you to give your views based on your knowledge and experience obtained through study, research, practice or personal experiences. Though not necessary, it is desirable that where you have knowledge on literature and see it helpful for this research you can point us to the evidence. The interest of this research is primarily to hear from you on research, policy and practice based issues in light of competitive advantage or disadvantage of SMEs and how they can be embedded in a servitization strategy for SMEs to be successfully supported towards the transition. Please answer the questions as fully as you possibly can.

The success of this Delphi is highly dependent on the quality of your input in Round One. Where relevant and possible please support your answers with evidence and examples. You are also encouraged to answer all questions to help our analysis and feedback to the panel in the next Delphi round.

4. Results

A report on the Delphi findings will be produced. The report will be used to inform the next stage of the research, which will involve SMEs and support network(s). The findings will also be published in conferences or relevant academic and practitioner journals. You will also be entitled to receiving a summary of the findings at the end of this Delphi exercise.

5. An opportunity for you to be influential

This is an opportunity for you to influence how SME support networks can deliver support to SMEs towards servitization. These small businesses also stand to benefit from your expertise. Please take this opportunity to inform Round One of this Delphi with your invaluable expert opinion.

A very big thank you in advance for your commitment and willingness to contribute in this research. Round Two and Round Three will be far less time consuming and demanding as all of us will now have got to speed with the exercise (estimated to take ONLY 20 MINUTES each).

6. Further information

Please feel free to contact the researcher should you need any help completing the questionnaire or have any questions about the Delphi:

Yaone Rapitsenyane, Primary researcher, mobile **+44 7842 43 7255**, email **Y.Rapitsenyane@lboro.ac.uk**

Round One Questionnaire

Please read the accompanying notes for participants before you answer questions.

Your individual responses will be confidential and used anonymously. Nevertheless you are requested to put your name and contact details on your completed questionnaire so that we can confirm we have your preferred and up-to-date contact details to enable you feedback on the results in the two subsequent rounds of the Delphi.

Name:

Phone number:

Email address:

Definition of key concepts

The following definitions have been provided in order to give clarity of the extent to which topical terms in this research may be used.

Value creation refers to the process of creating and delivering value through stakeholder relationships (Seth and Uslay, 2007), where value is the offering or proposition aimed at customer satisfaction.

Social constructs are perceptions, attitudes and behaviours of individuals or groups of people developed through social or cultural practice (Mallon, 2007) which influence the manner in which value is created and delivered in a society.

Product Service Systems (PSS) are a marketable set of products and services capable of meeting customers' needs (Morelli, 2002), where companies do not necessarily sell material products but the utility the products provide instead.

NB: When answering questions please type within the textboxes provided. The boxes are expandable to take any amount of text. The number of text boxes provided under each question is not necessarily the number of issues you may raise. You may include many issues in one box.

1. **What should manufacturing SMEs in Botswana comprise of in order for them to be competitive?**

You may want to include issues concerning social constructs in Botswana, market issues, innovation concerns, knowledge creation etc.

Please feel free to add more

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2. **What needs to happen to achieve competitive SMEs in Botswana in a Product Service Systems setting?**

You may want to include issues concerning support or lack of it, value creation, policy issues, possible drivers etc.

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3. **What might get in the way in a bid to offer support to SMEs in the transition to Product Service Systems in the context of Botswana?**

You may want to include issues concerning policy, the pace of technology uptake in Botswana, social constructs etc.

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4. **In which possible ways can the obstacles given in question 3 above be overcome?**

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APPENDIX B: ROUND TWO DEPHI CONSULTATION

Round Two Delphi Consultation

Notes for Participants

Thank you for returning your completed Round One Questionnaire. You will recall that the purpose of this Delphi survey is to primarily focus on developing priorities a strategy for transforming manufacturing SMMEs into service companies should address as well as factors that can be used by SMMEs in Botswana as competitiveness niches.

The purpose of Round One Questionnaire was to tease ideas out from your expert opinions in envisioning competitive manufacturing SMMEs through a design-led intervention. We are delighted to report that the quality of input from you has been very insightful and highly valuable in developing Round Two Questionnaire, which we now ask you to complete.

The results of Round One have led to Round Two Questionnaire questions being clustered under three categories of visions, strategies and barriers. The purpose of this questionnaire is to ask you to prioritise issues that can be targeted to be addressed and how they can be addressed through a design-led PSS oriented intervention. We also are seeking some feedback from your observations concerning your input and that of the group in Round One as you answer each section of this questionnaire.

In completing this questionnaire we draw your attention once again to the definition of Product Service Systems (PSS) which so far has been adopted for this study:

> **Product Service Systems (PSS)** are a marketable set of products and services capable of meeting customers' needs (Morelli, 2002), where companies do not necessarily sell material products but the utility the products provide instead.

Please complete the questionnaire in this word document. It is estimated that it will take you **only 20 minutes** to complete. When you are finished with completing it, save it and send it back to us as an email attachment in the manner you received it.

Confidentiality

Your responses will remain confidential and will not be disclosed to any participants or published tagged as views you aired. Any information shared with other participants or published will remain as collective group opinions as in this questionnaire.

Should you experience difficulties completing this questionnaire please contact Yaone Rapitsenyane at: Email Y.Rapitsenyane@lboro.ac.uk Mobile **+44 78 4243 7255**

To be used by researcher		
checked	entered	id

Round Two Questionnaire

Please read the accompanying notes for participants before you answer questions.

Your individual responses will be confidential and used anonymously. Nevertheless you are requested to put your name on your completed questionnaire for purposes of our records during this Delphi Study. It will also be very helpful to indicate your availability for **the third and final round** of this Delphi consultation (We will be glad to have you to the end).

Name:

Availability for Round Three: (Moving the cursor over the checkbox will allow you to check it by simply clicking inside the box) ☐ YES   ☐ NO

NB: If you are using an apple computer please save the document as .doc (earlier versions of word) to be able to be opened from other platforms.

The check boxes are electronic and clicking on it will mark your selection like this: {☒}

Please take your time and give us your comprehensive opinion

Section A: Visions of PSS competitive advantage for SMMEs in Botswana

Please rank the following items in order of their importance on a **scale of 1 to 5** where **1 represents not at all important** and **5 represents very important**

Question 1: In your view, which of the following are essential to address in order to Product Service Systems a viable business model for SMMEs in Botswana?

Items	not at all important scale very important				
	1	**2**	**3**	**4**	**5**
A1. Innovative and sophisticated SMMEs Originality, improved product quality, stylised and fashionable offerings, new and emerging trends	☐	☐	☐	☐	☐
A2. Sustainability and economic diversification Impacts of transportation, materials and manufacturing technologies, contextual practices and profit making interventions	☐	☐	☐	☐	☐
A3. Multidisciplinary SMMEs Collaborations and partnerships with businesses and Higher Education Institutions, building product development teams	☐	☐	☐	☐	☐
A4. SMMEs with PSS knowledge PSS awareness and appreciation; knowledge-based and practice-based competencies; PSS design and market considerations	☐	☐	☐	☐	☐
A5. Locally available resources Abundantly locally available materials (e.g., leather);skills; knowledge; technologies	☐	☐	☐	☐	☐
A6. The Market Technical sophistication (PSS) instead of the traditional product selling model; knowledge of market requirements; opportunity identification	☐	☐	☐	☐	☐

305

Items	not at all important scale very important				
	1	2	3	4	5
A7. SMMEs as Entrepreneurs Self-driven; knowledgeable; committed individuals; Business intimacy; positivity	☐	☐	☐	☐	☐

Please provide comments and adjustments you feel are necessary to be made looking at collective feedback from other experts captured in this section.

Section B: Strategies for achieving visions

Please rank the following items in order of their importance on a **scale of 1 to 5** where **1** represents **not at all important** and **5** represents **very important**

Question 2: In your view, which of the following do you see as important strategies that a design-led intervention can make an impact?

Items	not at all important scale very important				
	1	2	3	4	5
B1. Innovation Support Programmes Collaborative innovation systems (e.g., The Triple Helix); value addition to existing products; inspirational PSS database for best practice exemplars; assistance from established businesses; contextualised PSS offerings	☐	☐	☐	☐	☐
B2. PSS Mentorship Programmes Structured and progressive; targeted and driving high growth SMMEs	☐	☐	☐	☐	☐
B3. Collective Intelligence and value co-creation Partnerships and collaborations; popular participation; internal and external value co-creation	☐	☐	☐	☐	☐
B4. Knowledge Transfer Contemporary technologies; knowledge and practical-based competencies; adoption of industry culture; knowledgeable employees	☐	☐	☐	☐	☐
B5. Government Support Bilateral agreements; knowledge and skills exchange with knowledgeable, skilled and experienced international partners; rebates and incentives; subsidies	☐	☐	☐	☐	☐

Items	not at all important scale very important				
	1	**2**	**3**	**4**	**5**
B6. Resource Utilisation Locally available potentials to reduce costs; available and appropriate technologies	☐	☐	☐	☐	☐
B7. Strategic Choices Proper planning; competency specialisation; division of labour; outsourcing; part of a large value chain; KPIs, product/service differentiation; specialised offerings (e.g., leather shoes, bags)	☐	☐	☐	☐	☐
B8. PSS Policy Framework Adequate and protective; supportive and coordinative; promoting PSS; responsive	☐	☐	☐	☐	☐
B9. SMMEs Cooperatives and Clusters Mutual economic benefits	☐	☐	☐	☐	☐
B10. PSS Education	☐	☐	☐	☐	☐
Needs of SMMEs and stakeholders; PSS benefits; global competition					
B11. Communication User-manufacturer interactions; manufacturer-stakeholder interactions; PSS value and importance	☐	☐	☐	☐	☐
B12. Mind-set change Attitudes of customers; attitudes of SMMEs; reduce dependency on government initiatives	☐	☐	☐	☐	☐

Please provide comments and adjustments you feel are necessary to be made looking at collective feedback from other experts captured in this section.

Section C: Barriers to PSS adoption

Please rank the following items in order of their importance on a **scale of 1 to 5** where **1** represents **not at all important** and **5** represents **very important**

Question 3: In your view, which of the following barriers can be effectively addressed through a design-led intervention in order for SMMEs to adopt Product Service Systems?

Items	not at all important scale very important				
	1	**2**	**3**	**4**	**5**
C1. Stereotypes Economic (the current status quo seen as the only way of making money); fear of failure; ignorance of potential benefits of PSS; follower mentality (it can only be done once it has been successful elsewhere)	☐	☐	☐	☐	☐

307

Items	not at all important	scale			very important
	1	2	3	4	5
C2. Socio-cultural values Botho (not a good business value-small business run in loss as a result of being nice)	☐	☐	☐	☐	☐
C3. Socio-economic issues Low income society; less money in circulation; social life strains as a result of insufficient 'hand to mouth' income	☐	☐	☐	☐	☐
C4. Inconsistency of support from parastatals	☐	☐	☐	☐	☐
C5. Business leadership Knowledge driven instead of politically driven	☐	☐	☐	☐	☐
C6. Non-contextualised failing approaches	☐	☐	☐	☐	☐
C7. Poor company reputation Lack of sense of urgency towards positive image building	☐	☐	☐	☐	☐
C8. Financial High interest loans from financiers; lack of Research and Development; funding for PSS business ideas; cost of importing raw materials; high taxation rates	☐	☐	☐	☐	☐
C9. Legislation Obligations from existing trade agreements; unprotected local companies from cheap and poor quality imported offerings; Conflicts between existing agreements and developmental plans	☐	☐	☐	☐	☐
C10. Passive business culture among SMMEs (comfortable with the way they do business) Lack of outsourcing; less informative decision-making	☐	☐	☐	☐	☐

Please provide comments and adjustments you feel are necessary to be made looking at collective feedback from other experts captured in this section.

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What are your overall comments about the way the group views have been categorised and clustered?

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308

APPENDIX C: CASE STUDY SAMPLE CHARACTERISTICS

Case study sample characteristics

Number	Company	Years in operation	Number of employees (including owner/manager)	Person interviewed
1	SME A	5	4	Owner
2	SME B	7	2 (owners/managers)	Owner
3	SME C	8	6	Owner
4	SME D	30	8	Owner
5	SME E	5	2 (owner and employee)	Owner
6	SME F	3	4	Owners (all the 4 were present during the interview)
7	SME G	Start-up	1	Owner
8	SME H	4	3 (the other two are engaged on part time basis)	Owner
9	SME I	7	4	Owner
10	SME J	4	2 (owners/managers)	Owner
11	SME K	5	1 (engages part time staff when deemed necessary)	Owner
12	SME L	6	2	Owner
13	SME M	8	6	Manager (the only company not managed by the owner)
14	SME N	7	1	Owner
15	SME O	Start-up	1	Owner
16	SME P	2	1	Owner
17	SME Q	Start up	1	Owner
18	SME R	9	3 (the other 2 engaged on part time basis)	Owner

APPENDIX D: EXPLORATORY WORKSHOPS PROTOCOL

Main study: Phase 2

Exploratory Workshops protocol

Abstract

This protocol provides a detailed plan of the study starting with researcher's tasks to be completed before the workshop, details on items required during the workshops and the programme. The programme is detailed to show what exactly will be done and how it will be done. Finally, resources supporting each activity are provided as appendices.

Key to role allocation used throughout this document:

Facilitator: ❈

SMEs and designers: ✋

1. What to do before the workshop

Task	Deadline	Champion	Status
Workout suitable dates with companies interested in participating		❈	
Organise venue (preferably the same venue for companies in one location)		❈	
Formalise invitation (send invitation letters) to 3 companies who declared their interest (based in accessible locations and members of the national branch support network)		❈	
Recruit 2 designers with sustainable design knowledge/skills		❈	✔
Meet designers to brief them about the purpose of the workshop and introduce them to tools to be used to build common understanding		❈	
Recruit an independent observer		❈	
Meet SMEs to establish company objectives to be aligned with workshop activities		❈	
Prepare name badges for all participants		❈	
Prepare presentation for introducing design, sustainability and PSS, sharing findings, and launching the challenge		❈	

311

			✓
Prepare a programme for the day with time allocations			

2. Items needed on the day of the workshop

Item	Champion	Status
Printed programme		
Name badges (2 for SME representatives; 2 for designers; 2 for researchers)		
2 video cameras (easily movable with tripods)		
Power cables for video cameras		
Digital camera for still images		
Dictaphone (digital)		
Rechargeable batteries for Dictaphone and digital camera		
Table for 4 people to seat around it		
Flip board		
3 A2 flip charts		
A set of flipchart pens		
Drawing/sketching pens		
Sketch pads (3 sets A3 marker pads)		
3 sets of copic markers		
Pair of office scissors		
Modelling clay		
Post-it notes		
Stickers		
CD player (Play Bach maybe?????something unfamiliar)		
A pack of sweets		
4 jars of water and 6 glasses		

Food

Item	Champion	Status
Breakfast (tea/coffee/juice and sandwiches) Lunch (main meal only)	❋	

Activity 1 – making something out of nothing

Item	Champion	Status
Various types of scrap material	❋	✔

Activity 2 – linking company goals to the challenge (what is the big idea?)

Item	Champion	Status
ThinkCubate process	❋	✔
Dynamic user experiences context cards	❋	✔
Current situation characterisation net to be adapted with modifications (Ricardo's tool)	❋	✔

Activity 3 – building customer experiences and allocating resources

Item	Champion	Status
Personas	❋	✔
Stakeholder maps	❋	✔
Customer journey maps	❋	✔

Activity 4: focus on the product

Item	Champion	Status
Ecodesign web	❋	✔

Activity 5: putting it all together (PSS blueprint)

Item	Champion	Status
PSS blueprint (modify Morreli's (2006) tool and print out in A2 sheets	❋	✔
Adequacy form to be adapted with modifications (Ricardo's tool)	❋	✔

Activity 6 – business pitch

Item	Champion	Status
PSS business pitch evaluation sheet	❋	✔

3. Items needed after the workshop

Item	Champion	Status
All activity deliverables	✋	
Dictaphone (for evaluation interviews)	❋	✔

4. Programme

Design and Product Service Systems workshop for SMEs

17/10/2013 - 21/10/2013

aim: by the end of the workshop, SMEs should be able to recognise and apply design and Product Service Systems (PSS) capabilities to propose differentiated offerings

Time	Activities
08:00 - 08:10	arrival, intorductions and housekeeping
08:10 - 08:15	quick introduction of the workshop and its purpose
08:15 - 08:30	Activity 1: Lost on a Desert Island
08:30 - 09:00	Presentation
09:00 - 09:10	Brain dump
09:10 - 09:40	Activity 2: Linking company goals
09:40 - 10:00	Activity 3: building cusotmer experiences

10:00 - 10:20	**coffee break**

Time	Activities
10:20 - 11:20	Activity 3 continues
11:20 - 12:15	Activity 4: plotting a sustainable PSS blueprint
12:15 - 12:35	activity 5; business pitch
12:35 - 12:45	winding up and closure

Food time!

Loughborough University

5. Detailed programme

5.1. Arrival, introduction and housekeeping

Participants are met by the venue and checked against their names in the registration form to register as they arrive and receive their name badges inside

315

the workshop room. Everybody is shown a table with four seats arranged to allow interaction among four people and given the liberty to seat anywhere they wish to.

The **[facilitator]** thanks everyone for coming

'thank you all for coming and may I welcome you to the design and product service systems workshop for SMEs'…and goes on to introduce himself and gives the floor to everyone in the room to do so starting with their name, company, main product now and a rough appropriation of design input in their business. Responses are recorded by the **[independent observer]** in a form (Appendix A)

The **[facilitator]** then proceeds to housekeeping issues like locations of fire assembly areas in case of emergency and toilets. The workshop is then introduced and it's purpose stated including the duration of the workshop (reference is made to the programme);

[Facilitator] Thank you once again for coming. May I now set in context the reason we are all here, how long it will take and all interesting things we will do today…………….

The purpose of this workshop is to explore how your company can take advantage of design and PSS to propose new and differentiated offerings

In order to achieve this aim we will be working with designers today and I hope you enjoy learning from each other. The session takes 4 ½ hours (half a day). There will be various activities throughout the day mostly engaging you as a group composed of yourselves (designers and SMEs). By the end of the session you should have developed a business idea that you should proudly be willing to take forward.

Please feel free to be as interactive as you can as we are interested in seeing how you can use design and sustainability and propose a PSS business idea.

Confidentiality of your responses and your outcomes is guaranteed and use of any of your work will be attributed to anonymously. This is even more important as this session will be recorded both on video, still picture camera and manually.

Please feel free to seek clarity on any issue you feel needs to be explained further. So, any questions?

I hope everyone is ready to freely enjoy the day with us and think of doing things differently than we are all used to.

5.2. Activity 1: making something out of nothing

[Facilitator] launches the activity..

If you look around the room you will see some waste pieces of material which I would like us to kick-start our day with. Please feel free to have a play with the materials and come up with something that you can potentially sell. Think about who your customers could be, what would make them buy it and what would make you benefit from it.

You are free to do it alone or with other group members. After 10 minutes we shall all come around the table with our items, which we will chat about for the next couple of minutes.

[Independent observer] turns on the video camera located at a corner to have a panoramic view of the room

[Facilitator] uses the picture camera to snap pictures on the go as the group works

Participants are left to wander around the room, have a look at all available scrap material and get engaged.

[Observation schedule for all activities is mostly based on Barton et al (1980) cited in Robson (2011)]

Activity aims:

- To stimulate thinking differently
- To cultivate a positive perception about waste material
- To encourage group members value others' thinking

Observations:

- The ability to work independently and when to engage other people
- The orientation of the outcome away from what will be simply expected
- Difficulties
- How different items are being utilised
- Are the outcomes different?

Independent behaviours (how are they getting on, on their own?)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers doing everything and helping SMEs with everything without giving them a chance to have a go? Do designers discourage SMEs to equally engage on tasks with little or no guidance from them?)

Their discussions or actions are not interrupted but recorded using a video camera, picture camera and manual observation.

…after 10 minutes

[Facilitator] Thank you everyone. May we all gather around the table. Please bring what you have produced with you. Before we talk about all interesting items you have come up with, I'd like to briefly introduce you to design and sustainability.

[Independent observer] switches off the video camera and moves it to set it up for activities on the table

5.3.   Presentation part 1: design and sustainability

[Facilitator] I am going to give you a short presentation of what design is and how you it can be a benefit to your business in a sustainability context

[Facilitator] talk through a short slide show with a lot of visuals

Now back to outcomes of our activity

5.4.   Discussion

Get everyone to briefly describe what their offering is and who it is targeted to and how they will deliver it

Pull out observations to stimulate dialogue

How did you find the activity?

What were you able to do without assistance?

What was difficult?

How could you be supported to do it better?

Let us move on now to a brief talk on sustainability and Product Service Systems. I am going to give you a brief examples of about PSS and how some companies are doing it together with sustainability benefits

5.5. Presentation part 2: sustainability and PSS

[Facilitator] talk through a short slide show with loads of visuals of PSS example

5.6. Discussion

Is it a possibility?

Have you ever thought of your company offering as a PSS?

5.7. Presentation part 3: themes from main study stage 1

Now I'd like to share with you briefly some key findings of a study we did with you a few months ago. The purpose of the study was……

[Facilitator] shows the six themes from main study stage 1 and key issues pulled out to be addressed as a way forward. For example……..

- You will notice that from the findings it appears there is a lot of copying going on, with many companies producing a duplicate of almost the same thing

- There is also a common concern about the cost of raw materials which makes your offerings unaffordable as you have to recover all those through product sales

- This problem is further worsened by influx of cheap imports appealing to a lot of people however with low quality but nicely finished.

5.8. Brain dump (to remove participants from present company situation as they are likely to align their thinking to present offerings and to get them start reflecting on their challenges in a new and different way)

[Facilitator] asks the group to brainstorm: Can you think of what a PSS offering could be in response to these problems?

Coffee break

5.9.   Reminder about the purpose of the workshop

Welcome back from our coffee break. Once again the purpose of this workshop is to………

Now we are going to start getting on with more interesting activities and finally propose a sustainable PSS business idea that you can develop further for your company's benefit.

Before we go any further let us lay some ground rules;

- No criticising of other people's ideas

- Do not think that your idea is not good enough

- Listen to each other

…would you like to add any more?

5.10. Activity 2: Linking company goals to the challenge: what is the big idea?

[Facilitator launches the activity] let us begin part of our day with establishing a common ground to start working together. It's time to get excited but productive. I'd like to invite SMEs to share their company objectives with the designers as a way of moving forward to building a sustainable product service system relevant to your business. Once again please feel free to express your views and be willing to listen to others.

In order to support this process I'd like to introduce you to some tools to mix and match and use in a free thinking process.

[Facilitator] introduces tools on table 5 and briefly explains how they are used. This part will be supported further by designers during group interactions who would have already built familiarity with the tools as introduced during the pre-workshop briefing.

'Okay…let's get going. Remember, have fun'

[Independent observer] turns video on and **[facilitator]** turns the Dictaphone one and places it at the centre of the table

The process should start with the company sharing goals with designers then each brainstorm before getting back together.

'Please use post-it notes and the flipchart boards to record your ideas and discussions'.

[Group] discuss to embed company goals into the challenge

The stages of this activity shall evolve as follows;

- Company shares goals its goals with designers

- Group stimulate: everyone explore the external environment looking for opportunities. Discussions are based on PESTEL analysis (Appendix B).

- Group incubate: the group members reflect individually on ideas generated with random one to one quick discussions allowed.

- Group evaluate: the group get back together and decide which ideas are worth being taken forward, combined or dropped.

- Group elaborate: the emerging ideas are then looked at in line with an internal environments assessment against the current situation. Group uses SWOT analysis for internal analysis (Appendix B – modify tool to remove the ICT components). The use of this tool at this stage is to dissuade group members from locking their thinking back to the current status quo which is likely to result in incremental changes.

From this evaluation will emerge a possible PSS business idea(s) for the company to be explored in the next steps

Activity aims:

- Establish a shared understanding of the challenge between SMEs and designers and identify a PSS niche

- Establish how designers shaped and influenced the outcome

- To propose a PSS business idea to be explored in the next activities

- To bring up sustainability issues early

Observations

- Arguments from the company perspective – what SMEs value as important

- Contributions from designers –designers value as important?

- Barriers during the interaction

- How progression is made

- How the group engages with tools (what tools are SMEs inclined to? How are they using them?)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers or SMEs doing everything? Do SMEs discourage designers to equally engage on tasks with little or no guidance from them since it is about their business interests?)

[Facilitator] cautions group about time 10 minutes in advance and mentions the next activity

'okay everyone it is time to move on the next activity so let is wrap up. Now that we have our big idea it is time to investigate it in the context of our target users'

5.11. Activity 3: Building customer experiences and allocation of resources (Service life cycle)

With the idea now at hand, the group begins to brainstorm on how to deliver it. The concept exploration capability of design becomes essential at this stage. To support this brainstorming activity in a PSS context some tools are introduced to the group.

[Facilitator launches the activity] 'let us now think of think of users and how they might use the PSS. It is about delivering customer enjoyable and memorable customer experiences. So let is build scenarios and use cases. Say, a day in the life of Gold, a 28 year old working class lady (introduce personas). The scenario might be her shopping experience.

'Carry forward the thinking process we used in the earlier activity. Remember, there is no right or wrong. Explore as may possibilities as you can'.

'We shall be using personas to put in perspective the user and to get to realise the importance of starting the process with users'

[Facilitator introduces a stakeholder map]

Stakeholder maps: to allow the group to plot all actors needed for delivering this experience

'you will realise as you continue that you will need to involve other people or organisations to support your customer experience. So you will need to define those using a tool called stakeholder map'

Activity aims:

- Sensitise SMEs about the importance of thinking about users early in the process

Observations:

Independent behaviours (how are they getting on, on their own?)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers doing everything and helping SMEs with everything without giving them a chance to have a go? Do

designers discourage SMEs to equally engage on tasks with little or no guidance from them?)

[Facilitator] cautions group about time 10 minutes in advance and mentions the next activity

'Okay everyone it is time to move on the next activity so let is wrap up. Now that we have our customer experience, let us think of the product that supports it'

5.12. Focus on the product: designing for take back (product life cycle)

At this stage the group focuses on the product and explore various ideas for the product to support the user experience they have developed earlier and facilitate recycling.

The group continues with brainstorming approaches and recording ideas in various ways. Designers come in handy at this stage to expedite the process through rapidly sketching the concepts as other approaches like writing ideas down on post-it notes are also being used at the same time.

The product is being evaluated on the go with the ecodesign web to ensure sustainability considerations.

Activity aims:

- To provide an opportunity for designers to bring design and sustainability attributes to the product and allow the group to come up with a product to support the quality of the customer experience they have already built.

Observations:

- Interactions between designers as transmitters of knowledge and SMEs as receivers – shared language
- How SMEs interpret the knowledge
- How they absorb skills (any attempts to trying the same things designers are doing???e.g. sketching)
- Reactions of SMEs
- Modalities of engaging each other (assigning tasks among group members)

Independent behaviours (how are they getting on, on their own?)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers doing everything and helping SMEs with everything without giving them a chance to have a go? Do designers discourage SMEs to equally engage on tasks with little or no guidance from them?)

[Facilitator] cautions group about time 10 minutes in advance and mentions the next activity

'okay everyone it is time to move on the next activity so let is wrap up. We have defined the service and product aspects of our PSS. So it is time to put it all together'

5.13. Putting it all together (sustainable PSS blueprint)

After all the brainstorming of the service and product components of the PSS, a modified version of Morelli (2006) PSS blueprint is used to put the idea all together.

The group brings the product and service components in context as a blueprint of the idea. The adequacy form to be adapted with modifications (Appendix D) is used to evaluate sustainability of the PSS in terms of benefits to the environment, business and customers

Activity aims:
- To identify obstacles from a holistic systemic perspective
- To identify opportunities from a holistic systemic perspective

Observations:

Independent behaviours (which tasks are SMEs confidently carrying out on their own? What are designers doing at that time?)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers doing everything and helping SMEs with everything without giving them a chance to have a go? Do designers discourage SMEs to equally engage on tasks with little or no guidance from them?)

[Facilitator] cautions group about time 10 minutes in advance and mentions the next activity

'It is now to sell your idea. Let us do final touches to the prototype and get it ready to pitch it to myself and my colleague'

5.14. Business pitch

[Facilitator introduces the idea of business pitch]

'You are going to give us a short presentation of your idea and explain how you have been able to reduce material consumption of the offering but maintain business sense (profits) and how you have been able to reduce negative environmental impacts but not affect potential to make profits'

'In the process, please do tell us about foreseeable challenges to commercialise this idea and how you intend doing it'

The group is invited to give a 5 minutes business pitch of the idea emphasizing value to society (customers), value to the business, value to the environment, value to stakeholders following the criteria on Appendix E

Activity aims:

- To identify possibilities of implementation

Observations:

Independent behaviours (who is leading the presentation? Designers or SMEs)

Dependent behaviours (where did group members request assistance? How was it offered? How was it accepted?)

Independence-supportive behaviours (how group members encourage each other and how they discourage no-attempts to engaging on tasks)

Dependence-supportive behaviours (are designers or SMEs doing everything without giving each other a chance to have a go?)

Annexes in Appendix D

Annex 1: Participants profile

Annex 2: SWOT and PESTEL analysis tools

Annex 3: Adequacy form

Annex 4: PSS business pitch evaluation

Annex 5: ecodesign web

Annex 6: Persona

Annex 7: Stakeholder map

Annex 8: Evaluation interview guide

Annex 1: Participants profile

Participants' profile

Name	Company	Main offering	Design input
1.			
2.			
3			
4.			

Annex 2: SWOT and PESTEL analysis tools

SWOT Analysis Template

State what you are assessing here _____

(This particular example is for a new business opportunity. Many criteria can apply to more than one quadrant. Identify criteria appropriate to your own SWOT situation.)

strengths

criteria examples

Advantages of proposition?
Capabilities?
Competitive advantages?
USP's (unique selling points)?
Resources, Assets, People?
Experience, knowledge, data?
Financial reserves, likely returns?
Marketing - reach, distribution, awareness?
Innovative aspects?
Location and geographical?
Price, value, quality?
Accreditations, qualifications, certifications?
Processes, systems, IT, communications?
Cultural, attitudinal, behavioural?
Management cover, succession?
Philosophy and values?

weaknesses

criteria examples

Disadvantages of proposition?
Gaps in capabilities?
Lack of competitive strength?
Reputation, presence and reach?
Financials?
Own known vulnerabilities?
Timescales, deadlines and pressures?
Cashflow, start-up cash-drain?
Continuity, supply chain robustness?
Effects on core activities, distraction?
Reliability of data, plan predictability?
Morale, commitment, leadership?
Accreditations, etc?
Processes and systems, etc?
Management cover, succession?

opportunities

criteria examples

Market developments?
Competitors' vulnerabilities?
Industry or lifestyle trends?
Technology development and innovation?
Global influences?
New markets, vertical, horizontal?
Niche target markets?
Geographical, export, import?
New USPs?
Tactics: eg, surprise, major contracts?
Business and product development?
Information and research?
Partnerships, agencies, distribution?
Volumes, production, economies?
Seasonal, weather, fashion influences?

threats

criteria examples

Political effects?
Legislative effects?
Environmental effects?
IT developments?
Competitor intentions - various?
Market demand?
New technologies, services, ideas?
Vital contracts and partners?
Sustaining internal capabilities?
Obstacles faced?
Insurmountable weaknesses?
Loss of key staff?
Sustainable financial backing?
Economy - home, abroad?
Seasonality, weather effects?

328

PEST Analysis Template

Situation being analysed: _____

PEST analysis (political, economical, social, technological) assesses a market, including competitors, from the standpoint of a particular proposition or a business.

criteria examples	political	economical	criteria examples
ecological/environmental current legislation future legislation international legislation regulatory bodies and processes government policies government term and change trading policies funding, grants and initiatives home market pressure- groups international pressure- groups wars and conflicts			home economy economy trends overseas economies general taxation taxation specific to product/services seasonality issues market/trade cycles specific industry factors market routes trends distribution trends customer/end-user drivers interest/ exchange rates international trade and monetary issues
criteria examples	**social**	**technological**	**criteria examples**
lifestyle trends demographics consumer attitudes and opinions media views law changes affecting social factors brand, company, technology image consumer buying patterns fashion and role models major events and influences buying access and trends ethnic/religious factors advertising and publicity ethical issues			competing technology development research funding associated/dependent technologies replacement technology/solutions maturity of technology manufacturing maturity and capacity information and communications consumer buying mechanisms/technology technology legislation innovation potential technology access, licencing, patents intellectual property issues global communications

Note: PEST analysis can be useful before SWOT analysis because PEST helps to identify SWOT factors. PEST and SWOT are two different perspectives but can contain common factors. SWOT stands for strengths, weaknesses, opportunities, threats. SWOT analysis explanation and templates are at www.businessballs.com/swotanalysisfreetemplate.htm

Annex 3: Adequacy form

Question	Y	N	Explanation
Does this system contribute to building a business strategy towards a sustainable company?			
Are design and ICT creators of value in this system?			
Does this system help the company to develop or create new markets?			
Does this system encourage continuous innovation?			
Does this system improve the strategic position of the company into the supply chain?			
Does this system create differentiation for the company into the industry?			
Does this system produce savings for the company?			
Does this system contribute to the achievement of industrial efficiency?			
Does this system encourage sustainable behaviour in its consumers?			
Does this system improve the relationships between the stakeholders in the supply chain?			
Does this system contribute to create collaborative networks in the industry?			
Does this system improve the health and safety conditions in the company?			
Does this system contribute to creating awareness of sustainability in the company?			
Does this system use fewer resources than the current offer?			
Does this system produce less waste and residue than the current offer?			
Does this system use environmentally friendly raw materials?			
Does this system encourage longer life cycles?			
Is this system less material oriented than the current offer?			

Annex 4: PSS business pitch evaluation

Value factor	Yes	No
Value to society (customers)		
Improves quality of life		
Affordable		
Easily accessible		
Value to business		
Profitable across life cycle stages		
Saves money		
Less material intensive		
Facilitates recycling		
Opens up new markets		
Consolidates existing markets		
Possible with existing company technologies		
Possible with few technological investments		
Value to environment		
Less material intensive		
Promotes recycling		
Supports product take back		
Value to stakeholders		
Integrates resource usage		
Win-win situation		
Promotes collaboration		

Annex 5: ecodesign web

Shared use, multi-function products
Services, renting

NEW WAYS OF DOING IT!

Reuse of product/ components
Refurbishment
Recycling materials & components

END OF LIFE

Type/ number of materials
- Renewable, recycled,
recyclable, non-renewable,
non-hazardous, hazardous

MATERIALS
SELECTION

OPTIMAL
LIFE

Reliability, Durability
Easy to maintain
Easy to repair
Upgradable
Classic Design

MATERIALS
USAGE

Appropriate amount
for function
Number of parts

PRODUCT
USE

Type and amount of energy usage
Use of refills &/or consumables
(e.g. water, paper, toner, disks, film,
coffee cups)

DISTRIBUTION

Type and amount of packaging
Type of transport
Distances transported

VERY BAD
BAD
OK
GOOD
VERY GOOD

USE THE SCALE TO RATE THE
DIFFERENT IMPACTS OF
THE PRODUCT
YOU ARE LOOKING AT

Annex 6: Persona

PERSONA

Annex 7: Stakeholder map

STAKEHOLDER MAP

PROJECT   CLIENT

smaply
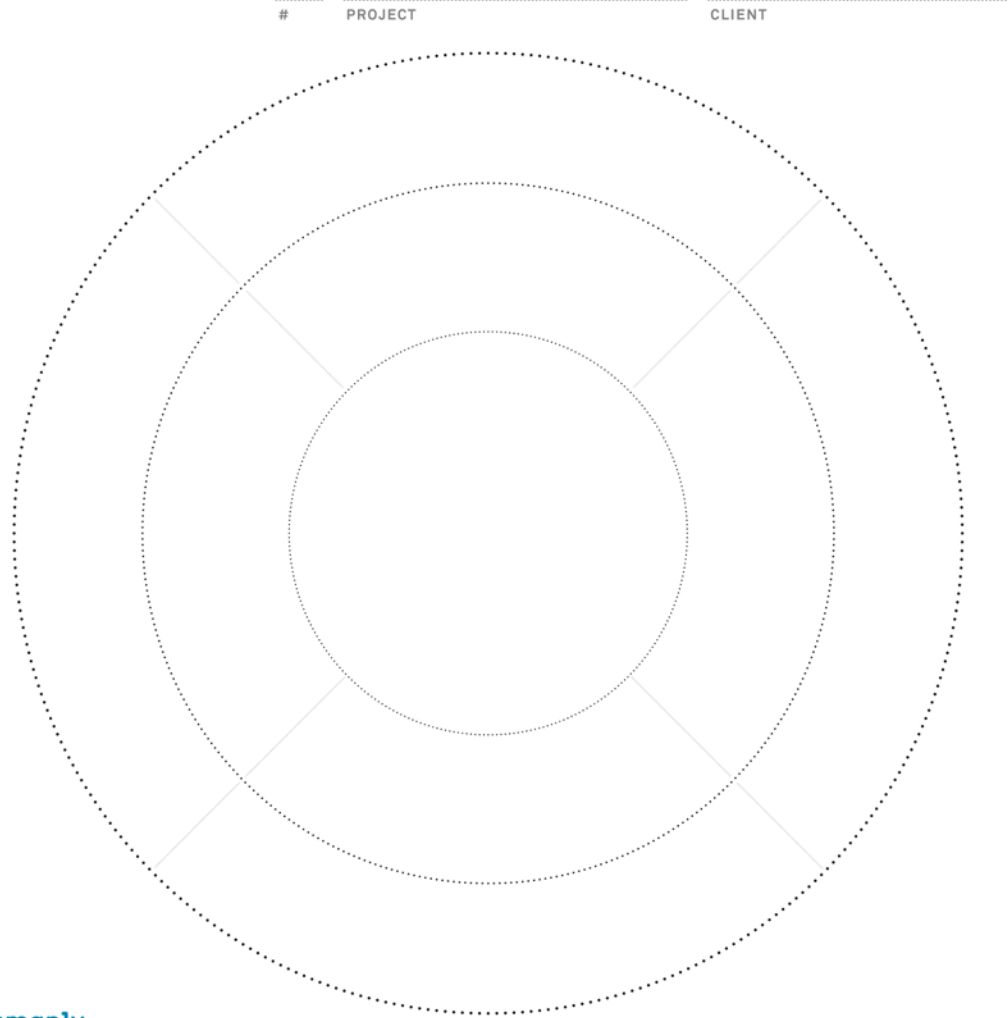
Annex 8: Evaluation interview guide

Interview guide for Workshop evaluation (for SMEs)

The purpose of the workshop is restated for participants to remember what the workshop was about.

1. How did you find the workshop? How did it help you recognise design and PSS potential in your business?
2. If you were a designer would it have been any different? How did you find working with designers? Would you do it again?
3. How did you find aligning your company vision to a PSS offering? In the process how do you define the role of designers and your role as a company?
4. If I may take you to one of the activities (building customer experiences), did you see any potential in the resultant systems for transforming your business?
5. How would you define your role and the roles of other stakeholders for the systems to be a success?
6. As a business idea, how much and how long does it require for you to exploit one or some of the systems you developed during the workshop? What opportunities do you see in commercialising them in a win-win scenario?

Thank you!

APPENDIX E: FULLY TRANSCRIBED INTERVIEW TRANSCRIPT

Interview Transcript

SME C owner and manager
Interviewed by Yaone Rapitsenyane
Gaborone – November 2012

[This interview was conducted as part of the PhD project on Leather SMEs competitiveness through a transition to sustainable Product Service Systems. The interview was conducted by the researcher, Yaone Rapitsenyane (YR) and the interviewed participant (KGM) is the owner of the business. The interview was recorded using a digital voice recorder].

YR: did you get interested in the leather business?

KGM: I started with shoe shine, shoe fixing and shoe cleaning then I just found myself in doing leather works. From leather works I went into shoe manufacturing, then I went into manufacturing of bags. That's my line.

YR: so your main products are bags?

KGM: yes sir that's my main line

YR: do you have any services you offer alongside manufacturing of bags?

KGM: we have not given up all those that we started with. Our business has become consumer oriented to the point that they influence growth and the pattern of products that we make today. When we did shoe shine they said why don't you clean them. After cleaning they said why don't you repair them. From repair they said they said why don't you make them and so on.

YR: as a result of your evolution from services how do your products perform in the market?

KGM: one thing that is affecting us is huge competition. You end up within your network structures; how many people you know and how much goodwill you've built with those people over the years.

YR: so how do you get them into the market?

KGM: before LEA we used to be aggressively advertising. Because of the incubation situation we do not advertise since we will be advertising for our future competitors in this area. Secondly we will be advertising for key competitors because we are all situated in this place. We used to advertise with the print media and radio up to 2010. We then focused on the future of our business which is manufacturing; getting our quality up to notch as well as finding new tricks in the leather business.

YR: what would you say are the main challenges of getting your products into the market?

KGM: the whole situation is affected by the price factor. Our manufacturing cost is more than India, is more than China. Our key market which is boutiques and small shops, they prefer going to China. They buy a pair for 40bucks instead of 100bucks here. The mark up is very huge. The same thing applies to bags. They buy them for P100 and sell them for P1000. With me you are going to buy that product for P500/P600. For chain stores the market is also fixed through South Africa. You have go through a buyer in South Africa; Cape Town, J'burg, Durban. When you try going through them they give you red tape. Even if you persevere you cannot launch because they support South African local industries. You cannot go through Pep stores, Cash bazaar, Studderfords and Edgars. As we speak they know our products, they know the brand, they are happy with the quality but they won't take them.

YR: what about the local market. Do you establish what they really want in terms of fashion or elegance and all other product related issues?

KGM: speaking for my company, we really do research before we do the product. We find out what the in thing is and what is next after the in thing. Sometimes you can be a day or two late such that by the time you finish the product it is out of fashion already. So what you do is you look at fashion history to track the trend so that you counter attack to the stage. Other than that potential customers do like our products. They have already set a certain standard of living which they wouldn't want to compromise.

YR: compromise in terms of ….?

KGM: these people afford these luxurious life styles. They drive expensive cars and live in these big houses and find their shops are very small (6*3 square metres). You wonder where they get all this money from! Huge mark ups.

YR: how do you build relationships with customers?

KGM: as a company we always have a complimentary product that we give to our big customers such that it personally fits what they want. After a big order we'll extend to them that they choose any of the products they would like to pick. I wouldn't call it buying customers. It is just complimentary. Just to say thank you. That is how we extend our relationship with customers. We exchange numbers so we kill the red tape of formality.

YR: let's go back to the fashion issue, the in thing issue. In the process of doing so, do you have any feature that you use to differentiate your products because that's one of the big issues in competition?

KGM: definitely sir. We have a small branding pattern and style that we use in our bags. You can actually tell that this is KG's bags. Secondly, with the issue of fashion

we are being approached by many fashion designers wanting to branch out into fashion and bags. They cannot meet their dreams because of the price factor. We end up saying, ok fine, go buy the leather yourself and we will charge you labour of P100 a piece. You have to try and mix your designs and patterns. For every pattern we'll charge you P100 per pattern and then we'll charge you P100 for each product. What you find out is the potential customer as a fashion designer cannot lift up because the industry itself is expensive. To source the leather is expensive. To go and get the leather is expensive. To get the right leather is expensive. Your specifications are expensive.

YR: so the impact of your differentiation in the market, would you say it is visible?

KGM: all I will say is that in terms of quality they cannot tell whether it is international or local unless you know where it comes from. We adopted that Italian flair. You cannot tell where they are from exactly unless the brand is very big. So people who buy these Italian products know the type of products that belong there.

YR: I am going to be lavish on this design issue because this is a big issue. Are you trying to explore other differentiation options? How much do you make people want to buy your bags?

KGM: if I had the right capital investment I would be able to afford my own point of distribution to retail my bags. The reason I'm saying that is we once went to Southern International Expo in South Africa, Mokalake Estates by Midrands. In that area we had a lot of appreciation for our products. They could not believe that we did these things from Botswana. They even said the way they know the products in Botswana there's so much improvement. They did not even negotiate on prices. I feel the market stature is Botswana is still behind and there's fierce competition.

YR: what about trying to cushion those with collaborations? Do you ever do collaborations?

KGM: there we are talking about production capacity where we can get an order out at the right time. Yes sir we have tried that. The first time we were dealing with another group. We were exporting bags to Lesotho. It put us into a serious problem since they did not meet quality somewhere. We had won the job because of quality but now if you bring in those other guys they can compromise you somewhere in terms of quality. 2, We learnt that it was a learning a curve but if we were to involve another party that we believe we can do bags with, we ended up saying if we do this involving a lot of people we are going to compromise on quality again. So we rather reduce the number and overstretch ourselves. What you realise then is the whole process of design and production becomes limited. It doesn't become a chain of mass production like it is done overseas. It becomes a unique piece of job. We do one bag from start to finish. So we had extended our hand to other people to help us.

YR: besides the negative aspects, what would you say are the benefits of involving other people?

KGM: what is important about the idea is that you get to be recognised. Goodwill is received because you do big orders and corporate jobs. Your name becomes top of the list. This man has supplied us on time, the product is here on time, the quality is good and the price is right. Eventually when you grow and you have the right people to work with in big orders you still have the reference.

YR: let's talk about tis word sustainability. How do you understand it?

KGM: Sustainability is very simple. It talks about consistency in supply, consistency in cash flow, consistency in survival. That is sustainability.

340

YR: what about environmental and social sustainability in terms of your products?

KGM: yes we do. We focus on leather. We look at whether after ten years the viability of that product will still be there and your brand will still be there.

YR: do you have any environmental sustainability initiatives? E.g., EMS

KGM: Sir I applaud you for that. One thing that the system fails to recognise is that small businesses have a life line. Our quality standards here in terms of registering with the system are very very pricy. Already we are having market challenges. If we put that into administrative costs it will change the price completely. therefore having ISO 9001, which is the quality standard will not be regularly affordable even if you registered for it.

YR: have you tried initiatives like recycling leather and refurbishing bags for reuse or reselling

KGM: that is very very interesting. I never thought of recycling bags for reselling but one thing for sure is we offer services for shoe cleaning, leather bag care. Though it is an issue of convenience on customers' side on our side is an issue of cash cow; that little cash that keeps us surviving. When it comes to refurbishing we have learnt that maybe if we mix leather with manmade materials like canvas the price of the product will go down but we still don't deviate from leather. Maybe that can also give us a competitive edge to meet demands of our customers which are boutiques.

YR: don't you think environmental sustainability initiatives like recycling can benefit you?

KGM: here it is different. Ladies hold on to a bag until it wears out. It gets really tattered. They end up buying another bag because they are forced to. Here ladies change shoes. Ladies afford shoes than bags in Botswana. In terms of recycling, we have the

upholstery side of the business. We have all these off cuts from upholstery. We bought this huge leather only for a steering wheel. What do we do with it? We can make a bag. We can get 2 bags from his piece of leather that will give you like P2000. But you have done recycling to some extent. The other little off cuts that we are left with w either do cell phone pouches to keep them in your line of products. In terms of recycling leather, it is very difficult to recycle leather that has been used because once it get worn out to treat it is more expensive than buying a new one.

YR: what would you say are the driver towards thinking about environmental sustainability initiatives?

KGM: we are bit ignorant on the issue in the sense that we use the pieces to the last bit then we dispose them in refuse bags. Whatever happens next we don't really know. Because in other countries they wove them together to make sheets out of which they can make shoes and bags. Here I don't know whether the skill, the laziness or the ignorance part of it is. Here we don't have the thought capacity to consider the environment with the little pieces. We only concentrate on big things. The costs also apply. The time I spend to make a bag is the same time I spend to make another bag. If I make one bag in leather I spend the whole day. If I make another using manmade material I spend the whole day. I spend the same amount of time but the costs are different. I'd rather spend time making a leather bag than from manmade materials because my margins here [leather] are better than the other margins [manmade materials]. If I think of small pieces, to start manufacturing that into a sheet that alone is the whole week but it doesn't guarantee I will get an immediate sale from that.

YR: do you think if you were to bring in the issue of trying to come up with an innovative way of using cut offs will improve your competitiveness?

342

KGM; there you are right. I was doing some research on the internet yesterday and I found some fashion bags. These bags were made of recycled material and the way they expressed it was very good. Then I started thinking about it, this can be something to look at. But then you have to look at it such that it becomes a business line itself such that there is a team that compiles the material. There is team that process those into sheets, there's a team that makes the products. There has to be a team so it turns out to be a lengthy process. Other than that it can actually work for us.

YR: are you aware of a business concept called Product Service Systems?

KGM: no I am not aware.

YR: what happens in the concept is that you tie a product to services that people might need, if you are selling fashion bags for example, you might not necessarily sell it but lease it out to these ladies and then tie to it services like polishing it, if they need to change it but at a mark-up. The bags come back to you. You have money coming back to you all the time. The other way is you sell it to them and tie care services to the bags as well to avoid people using recommended things.

KGM: [interrupts] for example some lady was saying she was using a hand lotion on the bag.

YR: ..so that's the concept.

KGM: just like saying getting a cell phone and then pay for the minutes.

YR: what do you think of the concept and the relevance of it in your business?

KGM: that's quite tricky because the market is very small. I'll look at fashion shows, exhibitions and stuff. To rent out bags for the evening they return them the following day or month after you have shown off yourself with a new bag. I think that's the only way it can work out. I think I'll have to put my mind to it and see how it can work out

343

for me. One thing I was thinking of was selling my bags on credit. The condition was that you commit yourself with 50% of the price then every month you can buy a any bag. If you want an extra bag you pay an extra amount. In that way the system is that we will be producing bags with the right number of skills. You know there will always be a customer. There is a credit line system which will indicate your arrears. Other than that your bags are there and your brand is getting known.

YR: contractual use of products will earn you money and recover your materials

KGM: I think it can work. You can refurbish it you clean it or replace other parts where you feel necessary. At the end of the day your brand is out there. The volumes start to increase and sustainability starts to play a major factor.

YR: let's talk about values. E.g., convenience, time, comfort, fashion etc. have you any?

KGM: we have thought of those such as flexibility, convenience and quality. We also want to relate it to pricing.

YR: do you have a design capacity to integrate these values into products such that they are visible?

KGM: yes sir we do that. Most of our products are never one strict product from start to finish. Is either we throw in different colours with every one that comes out or we change the style of finishing. You lose out on the market. You have to throw in every little idea into the product.

YR: do you look at various ways of styling the bags at the design stage?

KGM: if you are a designer you have to do a master pattern, like a standard form and from that it can tell you how best you can go off that to do various styles or designs.

YR: what would you say are the values that you would like to bring into your product to increase your competitiveness?

KGM: with branding we made it very raw to give it an African outlook because our standard is very international. When it comes to concepts involved we try to look at local market before we look at international markets. Our local market now is going into farming and life styles. It's going into canvas more. Everything is going into African styles.

YR: do you have any other comments?

KGM: the main customer for any business to survive is government. If you don't government, parastatals, big corporations you don't eat. That is why our businesses are suffering. Half of the time tenders are fixed, you can send a lot of time working on the tender document but that does not guarantee you getting the job.

YR: your annual turnover, what do you project in the coming year?

KGM: our annual turnover was close to a million last 2 years, it dropped to 4 it dropped to 2.

YR: thanks very much for your time.

Appendix F: Delphi participation invitation letter

RE: Invitation to Participate in the Delphi Study

Dear expert,

The researcher of an investigation entitled Sustainable Design leapfrog to Product Service Systems for Manufacturing SMMEs in Botswana has decide to carry out a Delphi survey with various SMMEs stakeholders in Botswana to gather information and ideas from different standpoints about how design can be used to improve competitiveness of manufacturing SMMEs in Botswana. Since SMMEs comprise of various industries, the Leather and Textile industries will be used as they seem to be emerging among priority sectors in Botswana as far as developing SMMEs as viable economic diversification options is concerned.

Following earlier consultations with yourself or your organisation(s), you are one of a group of 12 participants who have been asked to participate. Further recommendations from yourselves, in spite of different social or professional stratums will be appreciated. Your selection to be part of the panel was based on your knowledge and skills in either sustainable design and/or some issues affecting SMMEs in Botswana either from academic research, policy and practitioner perspectives.

The Delphi is an iterative three stage data collection process where thoughts and opinions of skilled and well informed individuals in their disciplines are collected and distilled, ultimately reaching a consensus. The process is conducted by email as anonymity of participants' opinions from each other is part of the effectiveness of the process. The modified Delphi process to be used in this study begins with open ended questions intended to generate various thoughts and opinions addressing concepts under each question. At the end of each round the researcher synthesises responses and sends the summary back to participants so that they can check representativeness of their views, review, add or delete items, additional comments and feedback in the questionnaire for the next round. The process is repeated for round three. The ultimate outcome is a prioritised list of recommendations for this research to address in order that design-led support for SMEs can help them gain competitive advantage.

The time commitment for Round One of the Delphi is estimated to be around one hour; an estimated total time commitment of one hour and forty minutes (1 Hour 40 minutes) or less for all the three rounds as the next two rounds are estimated to last for 20 minutes each. The first round will require written responses to three to four open ended questions. The last two subsequent rounds will require responses to questionnaires that will include mostly if not all closed questions. Since your anonymity is important for this exercise there will be no names or identifiers attached to any comments.

Please find below estimated dates for the Delphi rounds (the process may be faster than estimated depending on time taken to return responses)

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Round	28/05/2012	The first round questionnaire is sent to participants
One	04/06/2012	Round one responses are returned to researcher
	18/06/2012	Round one responses analysed by researcher
Round	25/06/2012	Round two questionnaire is sent to participants
Two	02/07/2012	Round two responses are returned to researcher
	16/07/2012	Round two responses analysed by researcher
Round	23/07/2012	Round three questionnaire is sent to participants
Three	30/07/2012	Round three responses are returned to researcher
	06/08/2012	Round three responses analysed and used to inform case study design for further research. A report also available for participants

Your availability for all the three rounds is important for consistency and quality of the envisaged outcomes. Please confirm here http://www.surveymonkey.com/s/PSLW3WW if you are still interested in taking part no later than 25 May 2012.

I encourage you to take this opportunity to influence the design of a support intervention for SMEs in Botswana and would enormously appreciate the unique contribution you would make.

Kind regards

Yaone Rapitsenyane
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APPENDIX G: INFORMATION PARTICIPATION SHEET

Loughborough University

Project Title: Supporting SMEs' adoption of sustainable Product Service Systems: A holistic design-led framework for creating competitive advantage

Participant Information Sheet

Main Investigator:

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What is the purpose of the study?

The purpose of this research is to explore how the micro sector of SMEs can improve their competitiveness through support towards offering a mix of products and services to satisfy customer needs. The reasons the study is being done include supporting Botswana government initiative of economic diversification drive in supporting SMEs and to explore ways in which SMEs in Botswana can effectively respond to the environmental and resources extinction concerns. Out of this research, the investigators hope to achieve a contextual way through which Leather and Textile SMEs in Botswana can be supported to improve their competitiveness at the same time being environmentally and socially cautious of their product and service development activities.

Who is doing this research and why?

This study is part of a Student research project sponsored by the University of Botswana and undertaken from Loughborough University. It is therefore undertaken by a sole researcher stated as main investigator above and supervised as given under the same section.

Once I take part, can I change my mind?

Yes! After you have read this information and asked any questions you may have we will ask you to complete an Informed Consent Form, however if at any time, before, during or after the sessions you wish to withdraw from the study please just contact the main investigator. You can withdraw at any time, for any reason and you will not be asked to explain your reasons for withdrawing.

How long will it take?

The one to one interview between you and the main investigator will take up to an hour at the most.

What will I be asked to do?

This is a engaging event where you shall be involved in some design work in line you're your company's objectives followed by a conversation style kind of interview to allow you to share your experiences about how your offerings could be more competitive at the same time being sustainable. You are encouraged to feel free to air your views.

What personal information will be required from me?

No personal identifiers are necessary for any of the purposes of this research, so there will be no need for your personal information, except your company details which may also be available in other documents available in the public domain.

Will my taking part in this study be kept confidential?

Your confidentiality is highly guaranteed. This research conforms to Loughborough University ethical procedures and during all data collection, analysis and storage ethical conduct will be adhered to. Audio data will be kept in its original form including all transcripts taken from it and shall be stored in a safe password protected personal computer of the main researcher and a locked drawer in case of any printed or field notes material. During analysis no information shall be tagged with your name nor any identifier used to that effect. All information will be coded such that only codes are referred to during analysis and reporting of data collected. Information collected from you, according to the Loughborough University Data Protection Policy in accordance with Data Protection Act 1998, may be kept for 10 years after which it must be destroyed. Since the duration of this research is 3 to 4 years, data will be destroyed within the10 year period.

What will happen to the results of the study?

The results will be used to inform satisfying the purpose of this research stated earlier and anonymously published in related academic and practitioner journals and conferences.

What do I get for participating?

If you desire, a report with results from this study will be available to be shared with you. Through the support structure to be developed, the research is also aimed at making strong recommendations to effect an impact in Botswana SMEs which you are one of.

I have some more questions who should I contact?

Please feel free to contact the main investigator at the contact details given above, should you have any questions you may need answered concerning this research.

**What if I am not happy with how the research was conducted?**

If you are not happy with how the research was conducted, please contact the Mrs Zoe Stockdale, the Secretary for the University's Ethics Approvals (Human Participants) Sub-Committee:

Mrs Z Stockdale, Research Office, Rutland Building, Loughborough University, Epinal Way, Loughborough, LE11 3TU. Tel: 01509 222423. Email: Z.C.Stockdale@lboro.ac.uk

The University also has a policy relating to Research Misconduct and Whistle Blowing which is available online at http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm. Please ensure that this link is included on the Participant Information Sheet.

APPENDIX H: INFORMED CONSENT FORM

Loughborough University

Supporting SMEs' adoption of sustainable Product Service Systems: A holistic design-led framework for creating competitive advantage

INFORMED CONSENT FORM
(to be completed after Participant Information Sheet has been read)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I agree to participate in this study.

Your name   _____

Your signature   _____

Signature of investigator _____

Date   _____

352