

A Critical Success Factors Framework for Sustainable Contract Manufacturing in the Consumer Products Supply Chain in South Africa: A Review

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Abstract

Manufacturing remains a critical driver for economic development in developing countries. Outsourcing of production to contract manufacturers companies (CMCs) is a global phenomenon that has gained prominence in the last three decades in the electronics and pharmaceutical products supply chains and has extended to the consumer products supply chain. Significant literature on manufacturing outsourcing and contract manufacturing and their role in the supply chain is available. However, there is very little scholarship on the critical factors that make CMCs sustainable businesses and important links in the consumer products supply chain, and what frameworks are available to assist the CMCs identify and put into practice these critical success factors, (CSFs). This study aims to fill this gap by identifying, through research, the factors that are critical for CMCs to be sustainable businesses that can contribute to the success of their clients and the economy. A sustainability framework will be developed from these CFCs, which will be tested in selected CMCs in South Africa. This framework will assist customers of CMCs to select and appoint the best CMC partner to work with and provide a roadmap for existing and aspiring CMCs to build organisations with the systems for success and sustainability.

Keywords

Contract Manufacturing, Critical Success Factors, Sustainability Framework

1. Introduction

Manufacturing has traditionally played a key role in the economic development of developing countries. It is now well established in the economic growth and development literature that there is a strong causal relationship between the growth of manufacturing output and the growth of gross domestic product (GDP), particularly in developing countries, with scholars and researchers mostly upholding Kalder's theory that manufacturing is the engine for growth after conducting research in both the developing and developed countries all over the world (Alexion and Tsaliki, 2010; Olamide and Oni, 2016; Pacheco-Lopez and Thirlwall, 2013; Szirmai, 2012; Tsoku et al, 2017;). As was the case in the last millennium, industrialization has continued to play a key role in the growth of developing countries, which have sustained rapid and long-term growth for the last 25 years (Moyo and Jeke, 2019). Achieving economic development by following the path of industrialization will likely remain important for low-income countries (Haraguchi et al, 2017). Globalisation has created new opportunities and competitive advantages, forcing producers to seek more efficient ways to make their products. It has become increasingly common for producers seeking more efficient means of production to divide the traditional vertically integrated model into stages or tasks, thus allowing them to outsource part or all of their production processes (Kamal et al, 2015), even to different countries. This therefore means there is a good opportunity for local manufacturing companies to set themselves as outsourced manufacturing partners for the local and global brand owners. The question this study aims to answer is "how does a potential provider of outsourced manufacturing services become a successful and sustainable business and a critical member of the supply chain?"

2. Research Methodology

The study starts with a review of literature to gather and analyse the wide range of studies and publications previously conducted on production/ manufacturing outsourcing and critical success factor frameworks for sustainability in contract manufacturing companies to come up with empirical evidence on the research area. Because of the limited literature on frameworks for CMCs the literature review was expanded to include literature on CSFs, frameworks and challenges in outsourced manufacturing, contract manufacturing, toll manufacturing, world class manufacturing, manufacturing

excellence and small to medium manufacturing companies. These findings will then be summarised as the critical success factors identified from literature and a success and sustainability framework will be proposed.

3. Literature Review

3.1. Outsourcing

The locus of production is no longer within the boundaries of a single firm but occurs instead at the nexus of relationships between a variety of parties that contribute to the production function, (Schilling and Steensma, 2001). Increasingly firms that traditionally manufactured their own products are outsourcing production and focusing instead on their core activities, including product design, research and marketing, (Plambeck and Taylor, 2005; Pun, 2015), while enjoying the cost advantages brought in by the expertise (Fisher, 2004; Handley and Gray, 2013; Urgan, 2017; Yang et al, 2018). There are many reasons why companies, original equipment manufacturers (OEMs) and brand owners are going the production/ manufacturing outsourcing route globally. Outsourcing has resulted in the development of a new paradigm that offers companies new opportunities for improving their bottom lines through the conversion of fixed costs to variable costs. They do this by reducing or eliminating in-house production capabilities and replacing them with contract manufacturers, (Pandya and Shar, 2013). The essence of manufacturing outsourcing is the use of production facilities of other firms rather than using those currently in-house or making new manufacturing investments Ehie (2001).

3.2. Drivers for Outsourcing Manufacturing to CMs

In May 2012 Pharma IQ conducted a survey with 100+ professionals from various functions in the pharmaceutical industry to establish the trends that enhance the ability for pharmaceutical and biotech companies to pick the right outsourcing partner (Pandya and Shar, 2013). The findings from this survey of the drivers for outsourcing are shown in the figure below:

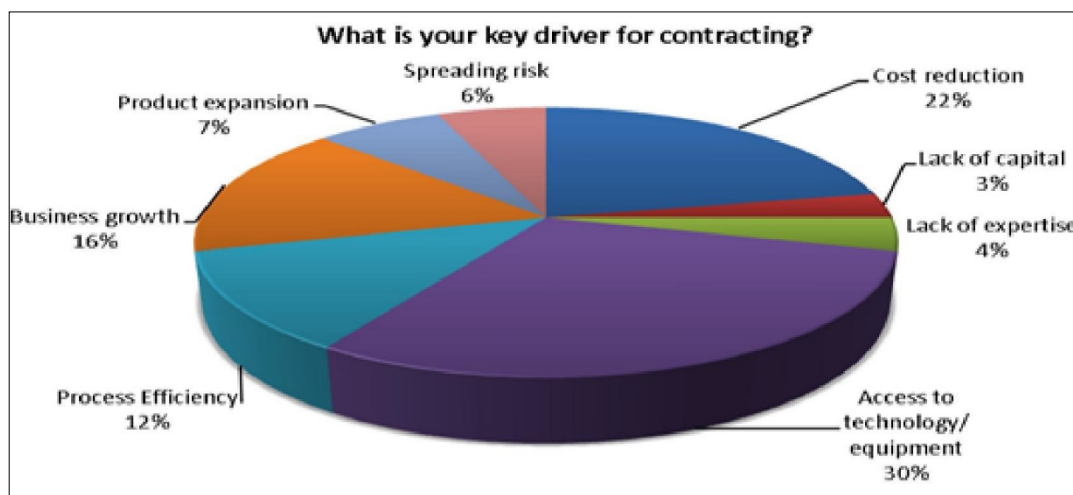


Figure 1: Key Drivers for Contracting

The majority of survey participants, 30%, cited access to technology and equipment as their key driver for contracting out their manufacturing operations. This was closely followed by cost reduction at 22%. The remaining respondents, cited business growth (16%), process efficiency (12%), product expansion (7%), spreading the risk (6%), lack of expertise (4%) and lack of capital (3%) respectively. Authors generally agree that some of the drivers for going the production outsourcing route are capital and operational cost savings (Bradley, 2004; Feng and Lu, 2012; Pandya and Shar, 2013; Pun, 2015; Schilling and Streensma, 2001; Urgan, 2017), greater economies of scale (Pandya and Shar, 2013; Urgan, 2017) and flexibility (Schilling and Streensma, 2001).

3.3. Contract Manufacturing

A growing number of companies in many industries either subcontract or outsource all manufacturing/ production operations to Contract Manufactures (Bradley, 2004). Contract Manufacturing (CM) is a global phenomenon and is a business model practiced in many industries including, Aerospace, Defence, Semiconductors, Energy, Medical devices, Personal care products, Biotechnology and Pharmaceutical Industry (Alamgir, 2013), with literature mostly referring to the electronics and pharmaceutical CM as the most common. It involves production of goods by a firm, under the label or brand of another firm (Pandya and Shar, 2013). It refers to the process of manufacturing of products of a “hiring” firm by a “hired” firm due to reasons mainly related to cost and expertise (Singla and Singh, 2019). CMCs provide such services to either several or single firms based on their own or consumers’ designs, formulas, and or specifications (Pandya and Shar, 2013). CMCs sell capacity under different terms to different buyers (Gupta and Wang, 2007). In

industries where production asset specificity is low, CM offers the potential for improved capacity utilisation because CMCs can pool demand from a diverse set of brand owners (Plambeck and Taylor, 2005). The figure below, adapted from Pandya and Shar (2013) shows a typical relationship and relationships between a brandowner/ customer and their contract manufacturer.

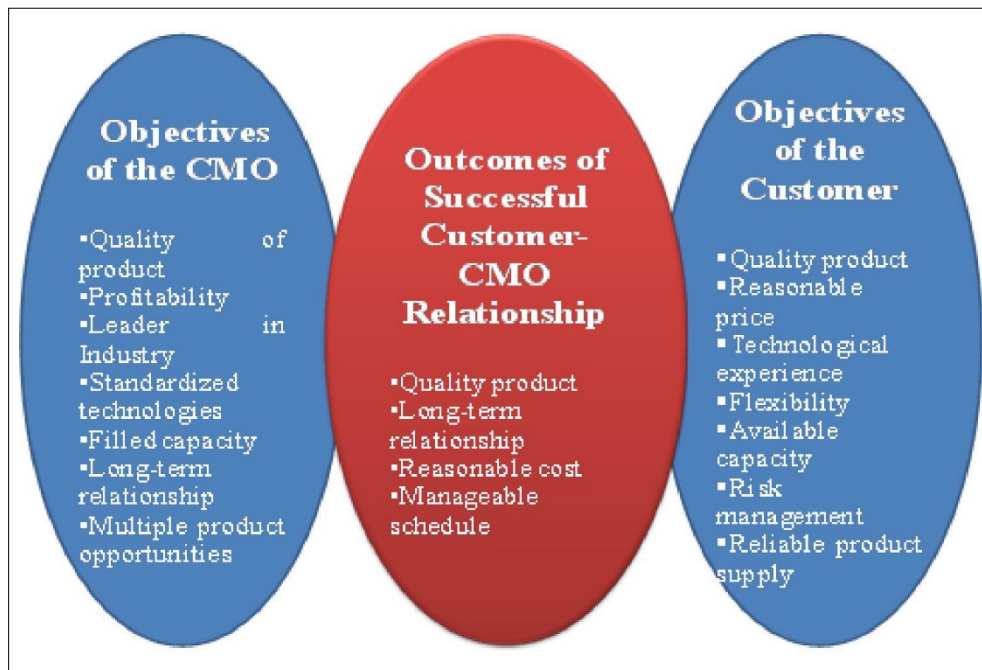


Figure 2: Relationship Between the Customer and the CMO

CM is clearly on the rise. The May 2012 Pharma IQ survey had the following key findings about the Pharmaceutical industry:

- 77% of companies currently use a contract manufacturing organization
- 31. % of survey participants cited access to technology and equipment as their key driver for contracting
- Managing operating costs is of paramount concern: 44% of respondent said operating costs will have the biggest impact on their contract manufacturing strategy in 2014
- 63% cited product quality as the most critical success factor for pharmaceutical contract manufacturing
- The majority of respondents said the greatest challenge they faced when working with contract manufacturers was maintaining quality. 18% of companies said their relationships with contract manufactures did not meet expectations (Pandya and Shar, 2013).

These numbers show a large dependence on CMs and the strategic position CMCs occupy on the supply chain. Contract manufacturing is also a lucrative business with high growth projections. Globally, CM revenue was estimated to reach USD370 billion in 2014, up from USD250 billion in 2009 (Feng and Lu, 2012). It was projected to be at just under USD600 billion in 2015 [5] and is expected to grow at a compound annual growth rate (CAGR) of over 6.6% during the forecast period between 2018 and 2023. The contract manufacturing market is segmented based on verticals that have a noteworthy contribution to market growth. Some verticals included in the market analysis are consumer electronics, aerospace and defence, energy, food processing and manufacturing, personal care, healthcare and life sciences, packaging, automotive and furniture (BCC Publishing).

Contract manufacturers differ from ordinary suppliers because they make products that are ready to go on shelf, products that must possess the same quality levels as those produced by the brand owners. This therefore means that they are a critical supplier to their customers' value chain because their products represent the customer at the consumer level without further value addition.

3.4. Risks of Outsourcing

While the outsourcing of production to contract manufacturers may provide many potential benefits to the buying firm, it also poses possible risks (Gray et al, 2016). Pandya and Shar (2013) highlighted the following potential problems, Fig. 3 below, with using a CMC from the same 2012 survey referenced above:

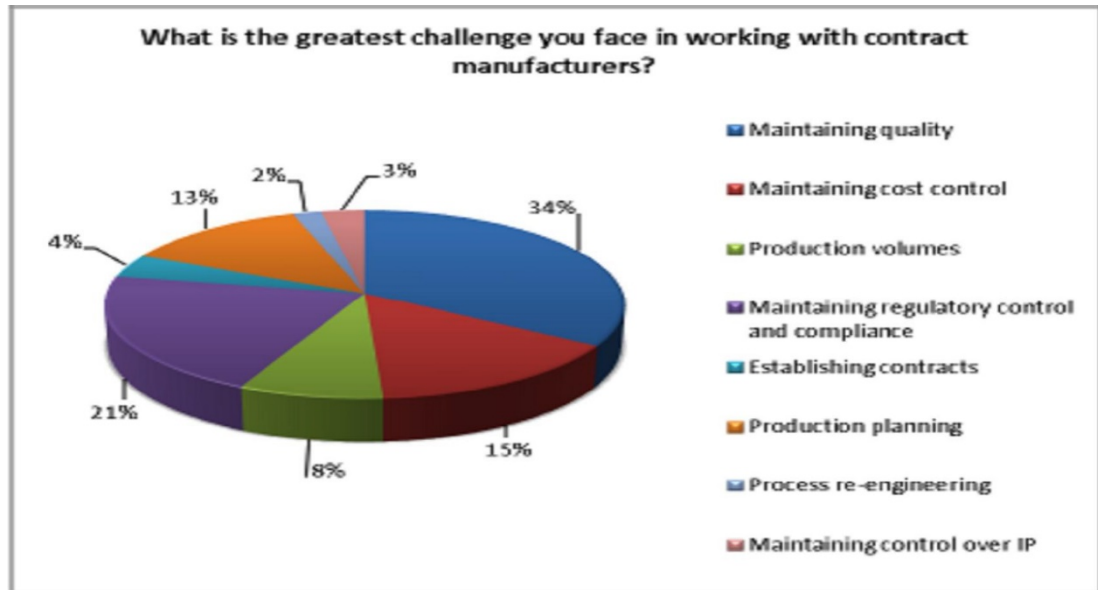


Figure 3: Challenges Faced When Working With Contract Manufacturers

The survey respondents were asked what challenges were having the greatest impact when working with contract manufacturers. For 34% the greatest challenge was maintaining quality, for 21% maintaining regulatory control and compliance and for 15% of respondents maintaining cost control. The remaining respondents cited production planning (13%), production volumes (8%), establishing contracts (4%), maintaining control over IP (3%) and process re-engineering (2%) respectively.

Pharmaceuticals companies and contract manufacturers must have a collaborative approach to these challenges, written quality agreements in place and mature quality systems in place to prevent and detect problems. Product quality was the most critical success factor for over 60% of the survey respondents. The remaining participants said delivery schedule 12%, cost effectiveness for 11%, CM/ customer relationship 8% and experience at 6%.

The literature surveyed is very clear about the reasons, advantages, opportunities and potential challenges of engaging CMs. What is missing is research and literature on how the CMCs themselves must be structured in order to be sustainable businesses and key members of the value chain. In other words there is an abundance of focus on the customer side but very little to none on the CMCs' critical factors and best practices for success. This is the gap that this research intends to close. The challenges from the survey in Fig 3 provide a good indication of what the customers are expecting and frustrated with and this study will use these as a guidance to developing the research methodology.

3.5. CMCs in South Africa

This section examines why there is a need for research into CMCs in South Africa. Several CMCs are present in the SA industry and from the researcher's experience working with CMCs in the pharmaceutical, home and personal care products supply chain in South Africa it was evident that the majority of them fall in the SMME category as defined by National Small Business Act as per the Gazette of 15 March 2019 as extracted below for manufacturing companies.

Table 1: SME classification

Size or class of enterprise	Total Full time equivalent paid employees	Annual Turnover (Rands)
Medium	51 - 100	Less than or equal to 170 million
Small	11 - 50	Less than or equal to 50 million
Micro	0 - 10	Less than or equal to 10 million

According to the Manufacturing Indaba press release as the forerunner to the Small Business Indaba in April 2016 *SMMEs are the engine for economic growth and are essential for competitive and efficient economic growth. Research has shown that SMMEs are critical for poverty reduction and can play a particularly role in developing countries. SMMEs are the largest providers of employment in most countries (especially of new job creation) and are a major source of new products and technological innovation.*

SMMEs, and therefore by extension CMCs, have a critical role to play in the development of the South African economy. As far back as 1994 the South African government saw SMMEs are seen as a vehicle to:

- address the problem of high unemployment levels in South Africa as they have a high labour-absorptive capacity,
- activate domestic competition by creating market niches in which they grow until they identify a new niche as a response to demand changes, and to be internationally competitive because of their flexibility
- redress the inequalities inherited from the Apartheid period - in terms of patterns of economic ownership and restricted career opportunities for black employees.
- contribute to black economic empowerment in that the majority of SMMEs is reported to be initiated, owned or controlled by those members of society who were discriminated against in South Africa's past; and,
- play a crucial role in peoples' efforts to meet basic needs in the absence of social support systems during restructuring processes – which refers in particular to South Africa's micro-enterprise segment and especially survivalist activities characterised by low entry barriers for inexperienced job seekers.

Baymout (2015) wrote that SMEs form the largest group of manufacturing firms which provide manufacturing and support services to large enterprises in many supply chains. SMEs comprise 70 to 90% of enterprises in most emerging countries like South Africa and therefore make a large contribution to entrepreneurship, GDP and employment creation. In Europe SMEs account for 67% of the jobs in the private sector, a figure that has risen to more than 80% for industrial companies, (Mouef et al, 2020). Given this large percentage of suppliers to large enterprises that SMEs occupy it means that the need for the SMEs as a critical part of the supply chain of the large enterprises and their sustainability and success depends on how well these SMEs perform in their role. This research will focus on manufacturing SMEs which play a CM role. Given the scarcity of scholarship on CSFs for CMCs the researcher reviewed literature on manufacturing SME companies.

3.6. Critical Success Factors (CSFs)

The idea that there are a few factors which are decisive for the success of the company, and that these factors can be ascertained, was first introduced by Daniel (1961) and later mainly elaborated by Rockart (1979); Bullen & Rockart, 1981) in the context of designing management information systems. Critical success factors (CSFs) are defined as the characteristics, conditions or variables which, when properly sustained, maintained, or managed, can have a significant impact on the success of an intervention, [19]. Bullen and Rockart defined CSFs as "the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization. Critical success factors are the few key areas where 'things must go right' for the business to flourish and for the manager's goals to be attained." (Bullen & Rockart, 1981; Howell 2010).

CSFs can be used at all levels of an organisation, from top executives down to the trenches. They can stem from internal improvement initiatives, such as a need to improve workplace efficiency or originate from external forces (Howell, 2010). According to Howel (2010), to be genuinely effective CSFs need to be part of a planning process, a management system, production or program goals or a specific individual pursuit. Identifying them is only the first step, once you know which factors are critical to your organisation's success you need to determine how to ensure top performance on those factors and measure progress as well as make adjustments as needed.

Howell (2010) went further to identify 4 types of CFS as follows:

1. Industry – Factors that are specific to a particular industry.
2. Strategic – Factors specific to an organisation's particular strategy, developed for competitive advantage.
3. Environmental – External influences such as technology advancements, the economy and political and regulatory actions.
4. Temporal – Factors arising from short term situations and forces internal to an organisation.

A successful organization-wide CSF program will incorporate all four types of CSF types. In most industries there are usually three to six factors that determine success, these key jobs must be done exceedingly well for a company to be successful. CSFs are therefore, for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation. If results in these areas are not adequate, the organisation's efforts for the period will be less than desired. CSFs are areas of activity that should receive constant attention from management. The current status of performance in each area should be continually measures and the information should be made available so as to track progress against achievement of business goals.

Why should an organisation identify and implement its CSFs?

Howel (2010) gives his reasons below:

1. Reduce the risk of failure in business and strategic objectives attainment
2. Further the understanding of management as to what it takes to successfully implement a strategic plan or a major change initiative

3. Achieve an increased employee buy-in to programs, systems, or process improvements
4. Increase dramatically the use of this value-added technique in planning, developing, and implementing programs, systems, process improvements, and operational enhancements
5. Facilitate continuous improvement of operations and process performance.

This is what this research will do with the selected CMs and their customers that will be researched.

These critical factors will emerge from the research on both CMCs and their customers, from which a framework will be developed. This framework will aim to bring together all core business and manufacturing systems that are critical to the success of the CMCs and their customers in a simplistic manner that makes it feasible and practical for CMCs to implement.

4. CSFs and Frameworks

To develop a new framework a better understanding of existing frameworks is required (Sharma and Kodali, 2008). This section provides insights into literature from scholars and reviews on CSFs for manufacturing and proposed frameworks for manufacturing and SMEs. Sharma and Kodali (2008) proposed the framework for manufacturing excellence in figure 5 below from an analysis of 23 frameworks previously developed by other researchers and scholars.

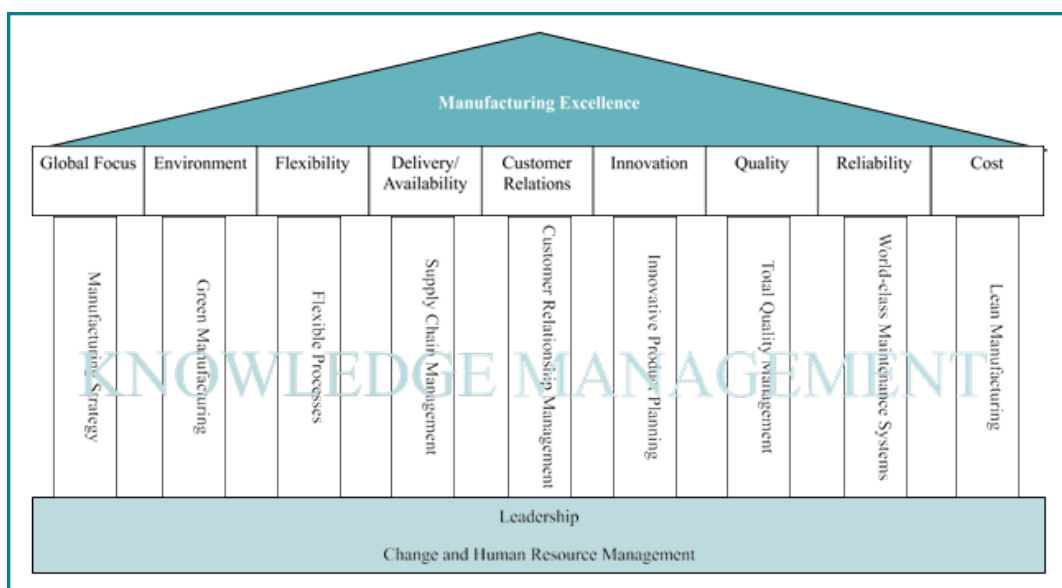


Figure 4 : Framework for Manufacturing Excellence

Goriwondo and Madzivire (2015) proposed the Wilgor Framework of Manufacturing Excellence after a survey of companies in the FMCG manufacturing sector. This is shown in figure 5 below.

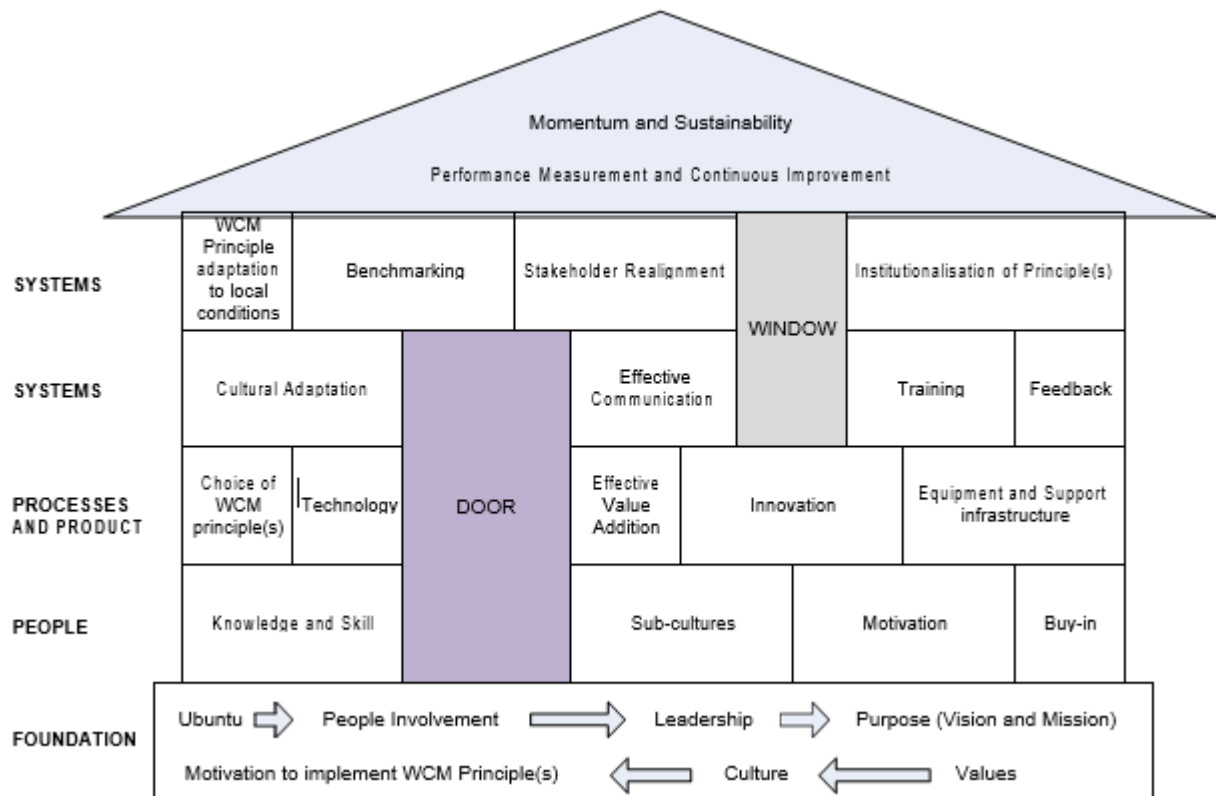


Figure 5: WILGOR Framework of Manufacturing Excellence

Other scholars also presented their frameworks on manufacturing and supply chain excellence, Gilgeous and Gilgeous (2001); Gupta (2013); Jasti and Kodali (2015); Paranitharan et al (2018); Selvam and Thangavelu (2019); Sharma and Kodali (2012), whose components and main factors are included in the findings section. Literature on CSFs in SMEs in general was presented by Ng and Kee (2012) summarizing 12 CSFs for competitive advantages for optimal business growth and success as follows:

- Leadership
- Intellectual Capital
- Organisational Innovation
- Organisational Competence
- Entrepreneurial Characteristics
- Human Resources
- Motivation
- Market Orientation
- Firm Characteristics
- Strategy
- Entrepreneur Reputation
- Organisational Culture

Sanjarifard and Mansor (2011) proposed a framework for the identification of CSFs for quality in manufacturing SMEs in Malaysia, as shown in figure 6 below:

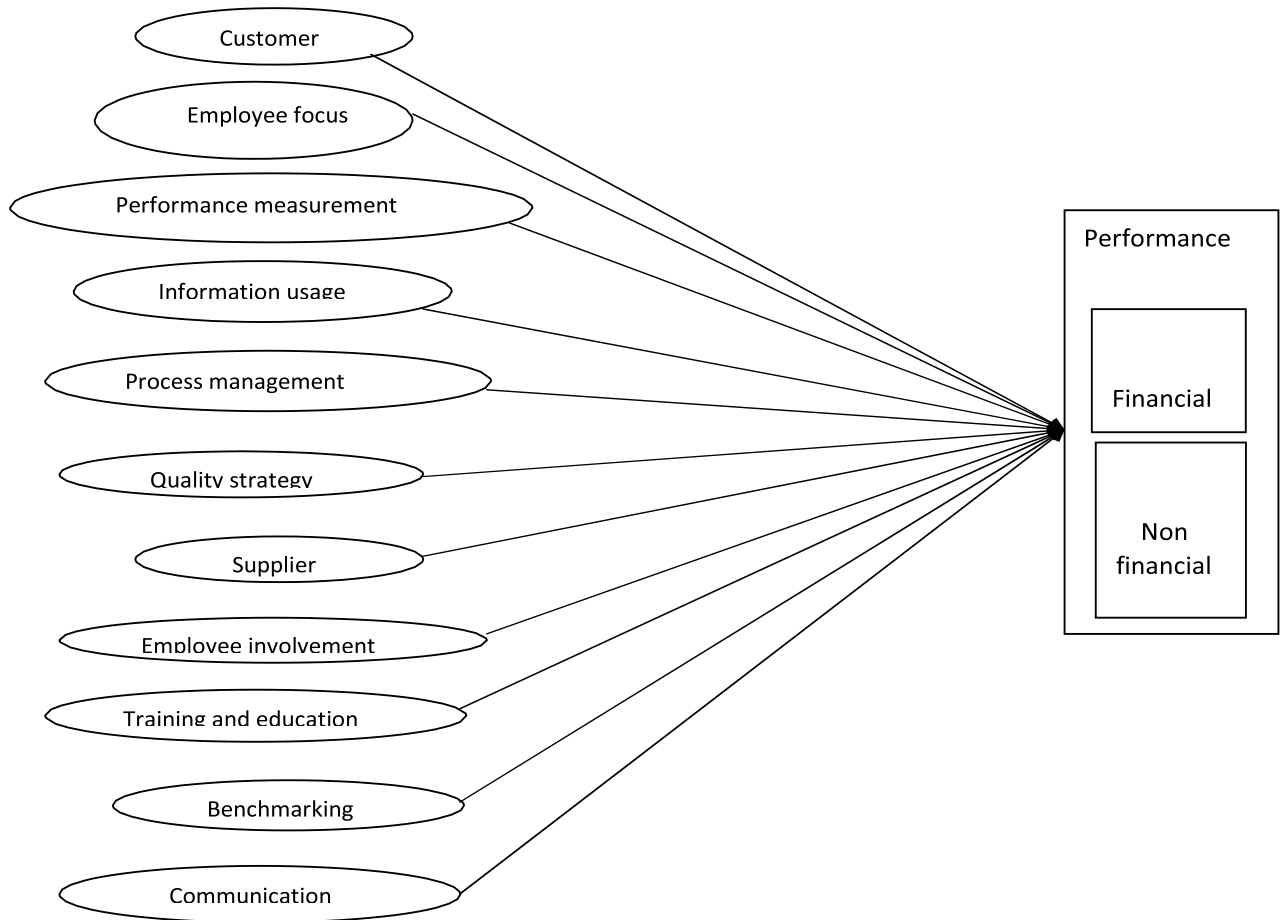


Figure 6: Proposed conceptual framework for identifying CSFs in Quality Performance in Manufacturing SMEs.

Ehie (2001) noted that the most successful outsourcing companies have the following:

- Strong relationships with their suppliers
- Hold high level strategic reviews
- Have an effective process for continuous improvement driven by performance measures and end user satisfaction measures.
- Have a strategic fit with their suppliers
- Seek partnerships with suppliers with the requisite expertise the company seeks.

Asikhia and Jansen Van Rensburg (2015) proposed the SMEs Wealth Creation model based of the following components:

- Human resources
- Technology
- Innovation and creativity
- Unit cost economies
- Organisational infrastructure
- Strategy

A study of manufacturing SMEs identified eight success factors for manufacturing network of SMEs, which are ranked by perceived degree of importance to the network as follows (Sherer, 2003):

1. Participant support
2. CEO Support
3. Confidence
4. Dedication
5. Capabilities
6. External relationships
7. Intermediary

8. Information Technology

Lofving (2014) identified the internal key factors for manufacturing strategy formulation in SMEs which are divided into four categories, procedure (what should be done), alignment (consistency between strategies, manufacturing strategies and manufacturing decisions), management (how the formulation is managed), and realisation (how the formulation is executed).

5. Results of CSF Emerging from the Literature Review

The limited number of articles on frameworks for CMCs' success and sustainability shows the need for further research for identifying critical success factors for building successful and sustainable CMCs and building frameworks that convert those CSFs into programs and practices to be implemented in the CMCs. The literature study was used to extract various concepts that are fundamental for building a critical success factors framework for successful and sustainable CMCs that are significant links in the consumer products supply chain. Due to the limited literature on CSFs for CMCs the literature review included articles on CSFs and frameworks for Manufacturing excellence and manufacturing SMEs to provide a direction to develop from. The authors in table 1 listed critical success factors and/ or proposed frameworks. Table 3 shows the most common factors for successes in manufacturing companies that emerged from the proposals from the authors

Table 2 - Authors and IDs who listed critical success factors and frameworks

Author	ID	Author	ID
Pandya and Shar (2013)	I	Sharma and Kodali (2008)	VIII
Lofving (2014)	II	Goriwondo and Madzivire (2015)	IX
Ehie (2001)	III	Jasti and Kodali (2015)	X
Ng and Ke (2012)	IV	Salvam and Thangavelu (2019)	XI
Sanjarifard and Mansor (2011)	V	Gilgeous and Gilgeous (2001)	XII
Asikhia and Jansen Van Rensburg (2015)	VI	Gupta (2013)	XIII
Sherer (2003)	VII	Sharma and Kodali (2012)	XIV

Table 3 Critical Success Factors for Manufacturing Excellence

Critical Factor	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	Frequency
Supplier Reliability	*		*	*	*	*	*	*	*	*	*	*	*	*	13
Customer Relationships	*		*	*	*		*	*	*	*	*	*	*	*	12
Technology & Information S	*		*				*		*	*	*	*	*	*	9
Strategy and Leadership		*	*	*	*	*		*		*	*	*	*	*	11
Organisational Culture	*	*	*	*	*	*	*	*	*	*	*	*		*	13
Capability and Skills	*	*	*	*	*	*	*	*	*		*	*	*	*	13

The analysis of the data shows that the main critical success factors emerging hierarchically from the literature review are:

1. Capability and Skills, Organisational culture and Supplier reliability (13) - A
2. Customer relationships (12) - B
3. Strategy and Leadership (11) -C
4. Technology and Information systems (9) – D

These results can be interpreted as follows for CMCs:

- **A** - CMCs sell manufacturing expertise and capacity. Therefore **skills and capability** are critical for their success. Success means everyone working in the company must work as if they own shares in the company and there is a culture of **continuous improvement** and unwavering focus on **supply efficiency, meaning supplying the right product at the right time at the right cost**. This group has the most critical success factor from the literature review.
- **B** - CMCs require solid, long term relationships with their customers/ clients to become sustainable. That is why **customer relationships** features at very close to the top of the list.

- **C**- CMCs must have a clear **manufacturing strategy** that enables to them to fully focus on manufacturing as their core competence and make this into a sustainable business. The **leadership** of the CMC develops **performance metrics** with leading indicators that enables it to control their processes.
- **D - Technology** plays a key role in effective operations and communication in a CMC and so is a critical to the success of the company.

Based on this literature survey and the factors that emerged below is a proposed framework that captures all these identified CSFs that can be applied to CMCs.

6. Proposed Framework for Implementing CSFs in CMCs

From the CSFs emerging from the literature review, the following framework for success and sustainability of CMCs is proposed:

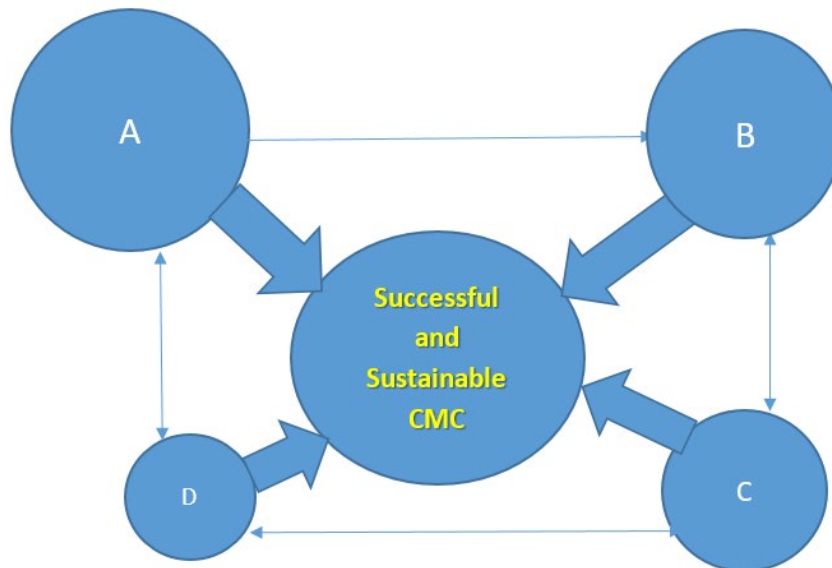


Figure 7: Framework for Successful and Sustainable Contract Manufacturing

7. Conclusion and Further Work

Given that there is limited scholarship on such an important topic as the critical success factors for sustainability in CMCs, which play a very critical role in global supply chains and industrialising economies through increased manufacturing activity, there is an obvious need to take this study further and survey existing CMCs and their customers in the consumer products supply chain in South Africa so that the framework can be further improved and developed into an implementation model. This model will then be tested through implementation in existing CMCs.

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