Zimbabwe Journal of Science & Technology pp 163-175 Vol.10 [2015]
e-ISSN 2409-0360
Zimbabwej.sci.technol

FRAMEWORK TOWARDS SUCCESSFUL IMPLEMENTATION OF WORLD CLASS MANUFACTURING PRINCIPLE(S). A MULTIPLE CASE STUDY OF THE FAST MOVING CONSUMER GOODS (FMCG) IN ZIMBABWE.

[1]Goriwondo, William Msekiwa and [2]Madzivire, Alex Benjamin

[1]National University of Science and Technology

[2] MaCoTra (Pvt) LTD and MaCoTra Business School

[1]william.goriwondo@nust.ac.zw or wgoriwondo@gmail.com

Abstract

The paper is the development of a framework based on a field study of four companies in the Fast Moving Consumer Goods (FMCG) manufacturing industry in Zimbabwe. The study was concerned with the phenomenon of failure or success in the implementation of World Class Manufacturing (WCM) principle(s). The Eisenhardt's Model of developing theory from case studies was used in this qualitative study. The process of data collection and analysis was heavily iterative using the Grounded Theory approach. NVIVO 10 software was used to analyse data and develop emerging themes and subsequently for development of a framework embedded in the data. The study draws upon WCM principles that had been developed as way back as the 1950's, yet companies in Zimbabwe were still struggling to implement them successfully, more than 60 years later. The key challenges as experienced by the case study-companies were established and their interrelationships developed. The WILGOR Framework of Manufacturing Excellence was developed. The six step framework towards constructing the WILGOR House of Manufacturing Excellence is presented. The framework uses the "house metaphor" in ensuring the construction of a strong house, signifying, successfully implementing appropriate WCM principles. The framework has not been fully tested, apart from some aspects of it, during consultancy work. This paper adds to the body of knowledge by providing empirical evidence of key challenges faced by case study companies mainly in the FMCG sector in Zimbabwe. In order to mitigate the identified key challenges, the WILGOR framework is proposed for use in the implementation of WCM principles in Zimbabwe. Enfolding literature established similarities and differences with other models. These were used to strengthen the WILGOR Framework of Manufacturing Excellence. Organisations are thus presented with a suitable framework that they can use, to increase their chances of successfully implementing WCM principle(s).

Key words: Effective Value-addition, Fast Moving Consumer Goods, ISO 9001, World Class Manufacturing

1 INTRODUCTION

The development of a framework suitable for implementing World Class Manufacturing (WCM) principle(s) is discussed. The paper seeks to highlight the main challenges that were established in a study featuring four (4) case study companies, all in the Fast Moving Consumer Goods (FMCG) sector in Zimbabwe. The study companies had taken initiatives to attain world-class status through implementation of WCM principle(s).

Manufacturing companies in Zimbabwe were not spared from stiff competition resulting from the globalisation phenomenon. Many companies faced closure while others had reduced capacity utilisation due to lack of competitiveness. Zimbabwe went through over a decade of economic decline, reaching its worst year in 2008. While some organisations closed shop, others remained operational and there was need to establish the challenges they faced and the success factors that led them to their survival and competitiveness. This study aimed at proffering a suitable framework for successfully implementing WCM principles. The emphasis was on the FMCG sector. The Grounded Theory approach as informed by the Eisenhardt Model was used in this multiple case study.

Success factors and challenges that the organisations experienced in their bid to successfully implement WCM principle(s) are highlighted in this paper and were used in the development of the WILGOR Framework for Manufacturing Excellence. This framework is recommended for use by organisations that aspire to successfully implement WCM principles.

Becoming a World Class Manufacturing (WCM) company is a common industrial goal Muda and Hendry (2002) which compels organisations to be among the best in the world in their type of business Todd (1995). They become competitive on a global basis, Kanter (1995) cited in Muda and Hendry (2002). The term "World Class" was coined way back in 1984 by Hayes and Wheelwright (1984) to describe the capabilities which had been developed by Japanese and German companies, as well as the United States of America (USA) firms which had competed equally with the Japanese and German firms, Salaheldin and Riyad (2007).

Bjurek and Durevall (2000) noticed that Zimbabwe had a well-developed manufacturing sector, which by the late 1980s' contributed about 25% of Gross Domestic Product (GDP) and produced over 7000 different products. This picture changed negatively due to the economic decline that followed the land reform program in year 2000 and the associated political standoff in the country, Mlambo and Raftopoulos (2010). These drawbacks resulted in shrinkage of the economy by over 40%, a decade long high inflation, which spiralled out of control to unprecedented levels of over 231 million percent by July 2008, Jones (2010), severe capacity underutilisation of below 10%, resulting in reduced manufacturing output. This combination of circumstances contributed to the collapse of the manufacturing sector.

Bond and Masimba (2002) cited in Carmody and Scott (2003) noted that, "a long period lies ahead in which damage done to a once strong industrial base must be repaired." There was need to revitalise the manufacturing base, among other industrial concerns. However Carmody and Scott (2003) argue that the change necessary to revitalise the Zimbabwe economy requires political solutions. This goes to show that the operating environment is an important factor for the manufacturing industrial subsector.

1.1 Theoratical Framework.

It is has been noticed by many authors and world-class practitioners Cannon, (1996); Confederation of British Industry, (1997); Morton (1994); Wickens (1995); Womack and Jones (1996); Womack, Jones and Roos (1990) that, as global competition intensifies, achieving world-class performance is not just a desirable goal, but a necessity for survival. Salaheldin and Riyad (2007: 552) points out that, "WCM companies are those that continuously outperform the industry's global best practices and which know intimately their customers and suppliers, know their competitors' performance capabilities and know their own strengths and weaknesses". Implementation and adoption of some WCM principles in developing countries have resulted in challenges and hence loss of competitiveness

Globalisation is a process by which regional economies, societies and cultures have become integrated through a global network of communication, transportation and trade Dreher, Gaston and Martens (2008). Companies from anywhere in the world have access to markets in the global village thereby increasing competition.

1.1.1 WCM Models

Some WCM Models have been developed and used over the years to implement WCM principles. The Hayes and Wheelwright (1984) model cited in

Salaheldin and Riyad (2007) identifies 6 dimensions that make up WCM. Incremental improvement approaches are key in attaining world-class status and should be driven by a workforce that has the requisite skills.

The Schonberger (1986a) model cited in Muda and Hendry (2002) is based on sixteen (16) main principles which were compressed into eight (8) main categories. The human resources factor also features in this model and in addition, he introduces consideration of the market. The processes and their capacity were established to be contributing towards world-class status.

The Kearney (1997) model identifies seven elements that are critical for success in attaining WCM status. These elements are shown in Table 1.

Table 1: The Seven Elements of World Class Manufacturing (Adapted from (Kearney, 1997)

Element	**Brief Description**
Leadership	The driving force, the voice behind the change initiatives
Production Cells	The organisation of people, materials, and machine tools to optimize information and product flow
Employee Involvement	Engaging the hearts and minds of the organisation to achieve Continuous Improvement
Materials Requirements Planning	Master planning, scheduling and performance feedback tool
Just In Time (JIT)	System for planning the details of the production system
Total Quality Management	The focus on prevention rather than detection
Standardization	A common focus and discipline to spread improvements across the organisation and sustain them.

1.1.2 World Class Manufacturing Principles

WCM principles have been developed by different scholars. Organisations in pursuit of WCM status have implemented these principles at various stages in response to the globalisation phenomenon. Success results projected some challenges along the way.

Table 2 shows the timelines of development of some important WCM principles and concepts.The major point to note is that while some of these WCM principles have been developed as way back as the 1950's, some organisations in Zimbabwe are still struggling to successfully utilise them for competitiveness.

.

Table 2: Summary of World Class Manufacturing Principles

Principle	**Brief notes on Principle**	**Year Introduced**
Total Quality Management (TQM)	Introduced by Feigenbaum through his concepts of Total Quality Control. Pycraft, Singh, Phihlela, Slack, Chambers, Harland, Harrison and Johnston, 1997)	1957
Quality	Emphasis on improving Quality of both product and service in order to be competitive	Late 1970's
Total Productive Maintenance (TPM)	Introduced by Seichi Nakajima (Nakajima, 1988); (Wang, 2006)	1971
Just In Time (JIT)	Value Addition should be done based on demand. Waste should be mitigated	Early 1980's
People related practices	Such as Teamwork, continuous Improvement, employee involvement	mid-1980's
World Class Manufacturing (WCM)	A term coined by Hayes and Wheelwright (1984) cited in Salaheldin and Riyad (2007) Popularized by Schonberger (1986b)	1984
Six Sigma (6σ)	Companywide improvement initiatives aspiring for excellence. Quality and defect reduction is key. Developed by Bill Smith at Motorola (Porter, 2002)	1986
Lean Manufacturing	Becoming a Lean Organisation calls for elimination of waste and wasteful activities in the organisation. Developed in the 1950s from the Toyota Production System (TPS) Further developed in the 1990's (Womack, et al., 1990)	1990's
Lean Six Sigma	Combining the benefits of Lean Manufacturing and Six Sigma.	2000

2 METHODOLOGY

A multiple case study featuring four case-companies in the FMCG were studied using the Eisenhardt's Model of building theory from case studies. The case-companies are identified in this paper by their pseudonyms, XPharm, TeaBread, GoodLife and YProducts. It was with the view that implementation of WCM principle(s) had not always produced favourable results as intended. All the four case companies have implemented and/or attempted to implement WCM principle(s) with differing levels of success.

Data collection for the study was guided by the Grounded Theory as informed by the Eisenhardt's Model steps. The study involved collecting data to answer the research questions. Being guided by the research constructs, document analysis, key informant interviews and Focus Group Discussions (FGDs) were conducted. This was done in the four case companies until theoretical saturation was reached. The

observation technique was also used whenever necessary.

3 RESULTS AND DISCUSSIONS

It was established that while there were over 22 WCM principles that have been developed over the years, the case-companies had implemented those shown in Table 3.

Table 3: WCM principles implemented

Goodlife	XPharm	TeaBread	YProducts
TPM	TPM	Preventive Maintenance	ISO 9001: 2000 QMS (Expired, certificate revoked)
ISO 9001: 2008 QMS	ISO 9001:2008 QMS	QA (Not certified)	Impromptu improvement initiatives
ISO 14001:1996 EMS	cGMP	PIP	
World Class Manufacturing	PIP		
MRP II & ERP	ERP		

Key : Abbreviations

cGMP	current Good Manufacturing Practices
ERP	Enterprises Resources Planning
ISO 14001:1996	1996 version of the Environmental Management System
ISO 9001: 2000	2000 version of the Quality Management System (QMS) standard
ISO 9001:2008	2008 version of the Quality Management System (QMS) standard
MRP II	Manufacturing Resources Planning
PIP	Productivity Improvement Program
QA	Quality Assurance
QMS	Quality Management System
TPM	Total Productive Maintenance

3.1 Key Challenges

Sixteen key challenges were established across the four case companies. These were ranked into levels according to a ranking model by Chong Hooi Cheah, *et al*. (2012). The levels show the relationships that exist among the challenges. Level I challenges are those that are highly dependent and influenced by other challenges. They are at the top of the hierarchy. Level II challenges are those that are influenced by Level III challenges. Level III challenges influence all the others and are independent in their nature. Figure 1 shows the hierarchical relationships of the key challenges in this study.

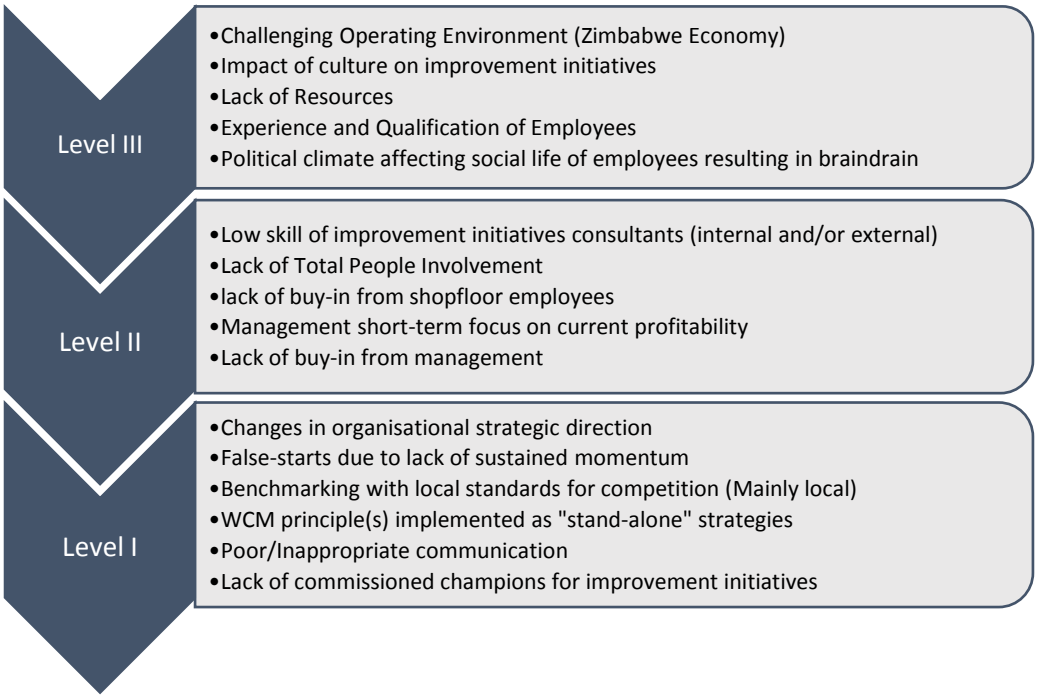

Figure 1 : Hierarchical Relationships to Key Challenges

Level III challenges in Figure 1 were found to be the environmental factors that influence Level II challenges. While the organisation and its employees have control over Level I and II challenges, they have no control over Level III challenges. In the prevailing economic and political environment, management needs to create a conducive environment that will assist in increasing the chance of success in the implementation of WCM principles. They need to put strategies in place that mitigate the impact of Level III challenges.

3.2 Themes

Eight (8) themes emerged from cross case analysis and the associated themes are shown in figure 4.These themes were the important indicators from case-evidence of the important considerations by organisations during implementation of WCM principles.

Linkages between the emerging themes and key challenges was established. The challenges being addressed by each of the emerging themes were identified. This relationship was used in developing a framework for implementing WCM principle(s).

3.3 WILGOR Framework of Manufacturing Excellence

A framework that enables organisations to successfully implement appropriate WCM principle(s) emerged. Lessons were learnt from all the four case-companies, but of significance were success traits from the GoodLife case and failure traits from the YProducts case. Case-evidence lessons from XPharm and YProducts were not ignored as they were consolidated in the resultant cross-case analysis.

Table 4: Emerging themes and associated theme statements

Theme	**Refined Theme Statement**
Source of Motivation to implement	Commitment to successfully implement WCM principles revolves around the source of motivation
Communication	Effective communication at all levels of the organization supports the successful implementation of WCM principles
Employee Involvement, Empowerment and Motivation	An empowered and motivated workforce contributes positively towards the success of WCM principles implementation
Capacity Building	Capacity building is required for successfully implementing WCM principles
Cultural Dynamics and Adaptation	Successfully implementing WCM principles revolves around Cultural Dynamics and Adaptation of the principles to local environment
Processes	Aspiration for improvement of processes to world's best practices increases the chances of successfully implementing WCM principles
Structures and Systems	Successful implementation of WCM principles revolves around sound structures and systems that support sustainability
Momentum and Sustainability	WCM principles implementation requires maintenance of momentum and structures that ensure their sustainability

This evidence together with identified gaps in literature formed the basis of the WILGOR Framework of Manufacturing Excellence.

The house metaphor was used in the framework. A strong house withstands adverse environmental conditions and continues to serve while a weak one gives-in to the same environmental conditions. In much the same way, organisations that aspire for WCM status, implement principles that would be effective and sustainable. A six-step framework to constructing the WILGOR House of Manufacturing Excellence emerged. Its main purpose is to mitigate and overcome the key challenges that were established from the study as well as ensuring continued sustainability of the implemented WCM principle.

3.3.1 WILGOR Steps for implementation of WCM Principles

The framework consists of six steps with each step label signifying the first letter of that step. Ultimately the steps in the WILGOR framework sets an organisation to construct the WILGOR House of Manufacturing Excellence. The six (6) WILGOR steps of implementing WCM principle(s) are shown in Figure 2 and each step explained thereafter.

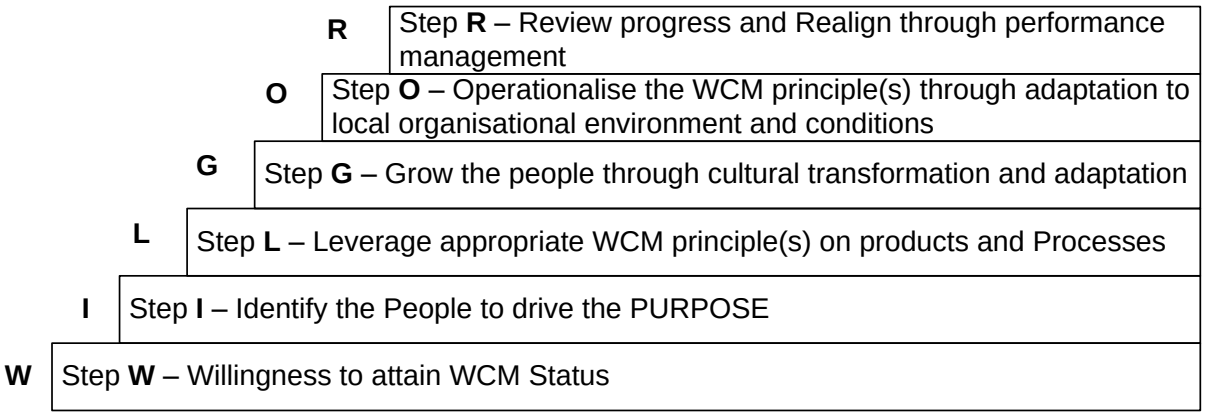

Figure 2 : WILGOR Steps in WCM principle(s) Implementation

Each step leads to the other, making the sequence of the steps an important feature of the WILGOR Steps.

Step W is the first step that sets the foundation of the WILGOR House of Manufacturing Excellence. It addresses those issues which will ensure the continued existence of the implemented WCM principle(s) as long as it continues to be relevant.

Step I is the second step that considers people in the organisation.

Step L, the third step is about the products and the processes that make them. The important considerations in the value-addition steps are discussed.

Step G and O are the fourth and fifth steps that deal with systems. The systems synthesise the people, products and processes in the value-adding chain.

Step R while being the last step in the WILGOR Framework of Manufacturing Excellence ensures that there is continuous improvement by maintaining momentum and fostering sustainability.

It also emerged that the WILGOR Steps of Implementing WCM principle(s) result in the construction of the WILGOR House of Manufacturing Excellence and the major features of the house are illustrated in Figure 3.

The WILGOR Framework of Manufacturing Excellence reflects how the established key challenges are overcome in implementing WCM principle(s) with special reference to the FMCG manufacturing in the Zimbabwean context. In order to complete the sustainable implementation of any chosen WCM principle(s), organisations should follow the six WILGOR steps that would result in the WILGOR House of Manufacturing Excellence shown in Figure 3. Each building block is important and is completed by following the WILGOR Steps.

3.3.2 Comparison with other models

The WILGOR Framework of Manufacturing Excellence was compared with other models to identify similarities and differences.

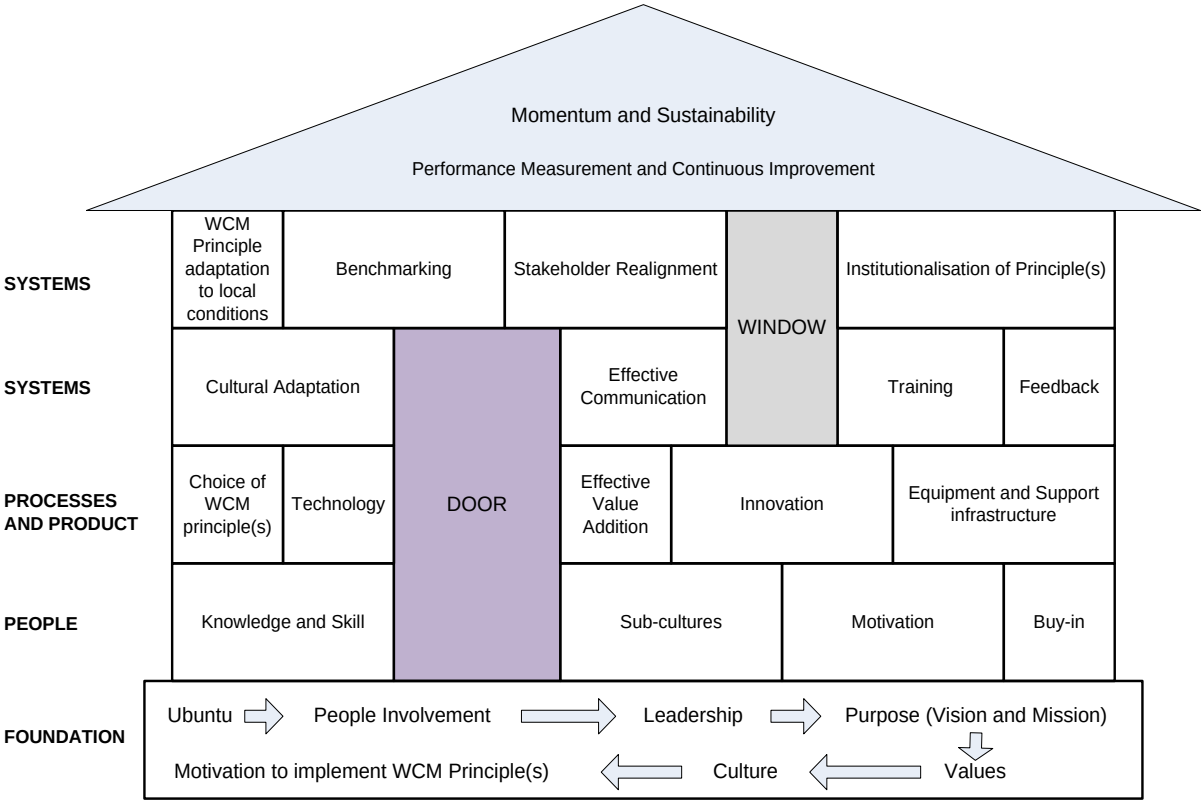

Figure 3: WILGOR House of Manufacturing Excellence

It shares some similarities with the Madzivire Collaborative Transformation (MaCoTra) Model ,Madzivire: (2011b) though some differences exist. The MaCoTra Model addresses organisations that transform and the WILGOR Framework addresses organisations that aspire to attaining WCM status. Moving from their current status to WCM status requires transformation of an organisation.

In comparison with the SHINGO Model, The Shingo Institute (2014), some similarities were identified. The SHINGO Model was designed to guide organisations aspiring for transforming organisational culture towards achieving ideal results as shown in Figure 4.

The SHINGO Model introduces “Guiding Principles” on which to base improvement initiatives towards “ideal results and enterprise excellence”. Compared to the WILGOR Framework, the aspiration in the SHINGO Model is to drive organisations towards WCM status.

The SHINGO Model emphasises the importance of people and culture in implementing improvement initiatives. This is reflected in the WILGOR Framework in Steps I and G where people are identified and developed through cultural transformation, The Shingo Institute (2014) highlights that when the required results are not achieved, we often try to change systems or implement new tools. This, they say, is incomplete when there are no people. “Tools and Systems alone do not operate a business. People do” The Shingo Institute (2014: 7).

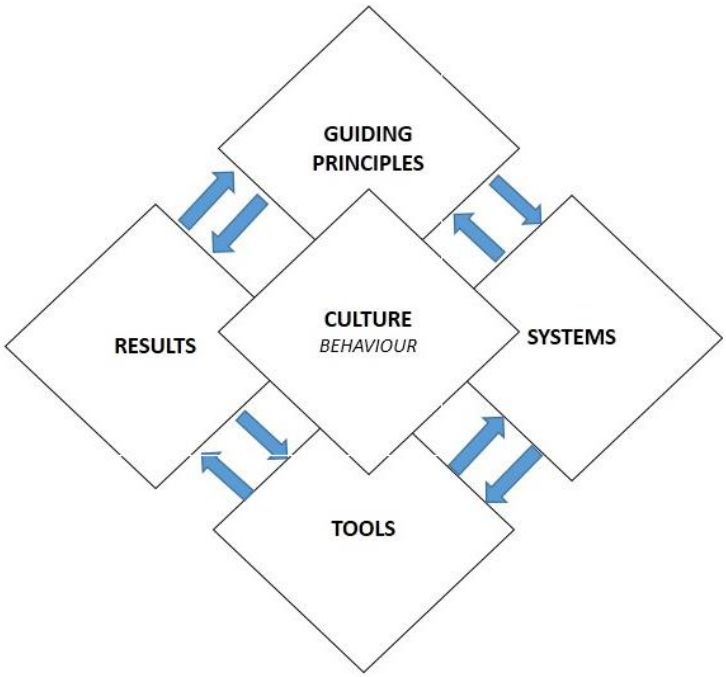

Figure 4: The SHINGO Model (The Shingo Institute, 2014)

Another model cited in Cagnazzo, *et al*. (2010: 166) shows that Critical Success Factors (CSF) that frequently arise in Quality Improvement Initiatives are the following:

"1). Management involvement and organisational commitment

2). Project selection, management and control skills

3). Encouraging and accepting cultural change, and

4). Continuous education and training".

Management involvement is highlighted as it relates to the source of Motivation to implement improvement initiatives. The WILGOR Framework insists that success in implementation is attained if management has an intrinsic source of motivation and not being forced from outside. This self-motivation should be passed on to all employees through their buy-in.

However, there were some differences with the WILGOR Framework found in enfolding literature. While the WILGOR Framework picks on communication as a vehicle towards successful implementation of WCM initiatives, Worley and Doolen (2006) established that improved communication was a result of lean manufacturing implementation. In the same study, they concluded that, "increased communication with employees on the factory floor was a positive outcome of the lean manufacturing initiative, but many examples of poor communication were also collected" Worley and Doolen (2006: 243). Their conclusion makes it a key challenge as established in the WILGOR Framework and hence an important building block of the WILGOR House of Manufacturing Excellence. When used as a building block, communication will further improve as a result of implementation of WCM principles. Their argument brings communication and improvement into the "chicken and egg story".

4 CONCLUSION

This paper presents empirical evidence on the challenges and successes faced by

manufacturing companies as they aspire for World Class Manufacturing (WCM) status in Zimbabwe with special reference to the FMCG. Using constructs developed from initial related literature review, the key challenges and emerging themes were established.

The Eisenhardt's Model of Building Theory from case studies was successfully applied in this study. A multiple case study of four companies in the FMCG was conducted. A framework emerged that led to the development of the WILGOR Framework of Manufacturing Excellence. The framework consists of the WILGOR steps of implementing WCM principles that result in the WILGOR House of Manufacturing Excellence. The framework was validated by enfolding literature. The six steps in the WILGOR framework borrow the UBUNTU principle as each step's first letter coincides with the shortened name of the researcher.

The researcher recommends that the WILGOR Framework be tested in the implementation of WCM principles in the FMCG as well as in other manufacturing setups.

5 ACKNOWLEDGEMENTS

The author is grateful to the NUST Research board for providing some funds to conduct this research. Gratitude is also due to management and staff of case-companies who assisted in allowing the researcher to conduct this study and cooperated during the study.

REFERENCES

Bjurek, H. and Durevall, D., 2000. Does Market Liberalization Increase Total Factor Productivity? - Evidence from the Manufacturing Sector in Zimbabwe. Journal of Southern African Studies, 26;(3), 463-479.

Bond, P. and Masimba, M., 2002. Zimbabwe's Plunge: Exhausted Nationalism, Neoliberalism and the Search for Social Justice. Scottsville: University of Natal Press.

Cagnazzo, L., Taticchi, P. and Brun, A., 2010. The role of performance measurement systems to support quality improvement initiatives as supply chain level. International Journal of Productivity and Performance Management, 59;(2), 163-185.

Cannon, T., 1996. Welcome to the Revolution-Managing Paradox in the 21st Century. London: Pitman Publishing.

Carmody, P. and Scott, T., 2003. Industry and the Urban Sector in Zimbabwe's Political Economy. African Studies Quarterly 7; 53-80.

Chong Hooi Cheah, A., Wong, W. and Deng, Q., 2012. Challenges of Lean Manufacturing Implementation: A Hierarchical Model. Instanbul, Turkey.

Confederation of British Industry, 1997. Fit for the Future: How Competitive is UK Manufacturing, London.

Confederation of Zimbabwe Industries, 2010. 2010 Manufacturing Sector Survey, Harare.

Dibaja, Z., 1997. Globalization: The last sky. The European Journal of Development Research, 9;(1), 107-127.

Dreher, A., Gaston, N. and Martens, P., 2008. Measuring Globalisation: Gauging its Consequences. New York: Springer Science + Business.

Eiilm University, 2012. World Class Manufacturing. [Online] Available at: www.eiilmuniversity.ac.in [Accessed 20 July 2012].

Hayes, R. H. and Wheelwright, S. C., 1984. Restoring Our Competitive Edge: Competing through Manufacturing. New York: John Miley.

Jones, J., 2010. "Nothing is Straight in Zimbabwe": The Rise of the Kukiya-kiya Economy 2000-2008. Journal of Southern African Studies, 36;(2), 285-299.

Kanter, R. M., 1995. World Class: Thriving Locally in the Global Economy. New York: Simon & Schuster.

Kearney, W. T., 1997. A Proven Reven Elements of World Class Manufacturing. National Productivity Review, Autumn, 67-76.

Kodali, R. and Sharma, M., 2008. Development of a Framework for Manufacturing Excellence. Measuring Business Excellence, 12; 50-56.

Madzivire, A., 2011(b). MaCoTra Singing ORGANISATIONS THAT TRANSFORM: ADDRESSING THE CHALLENGES in the Emerging Economy of Zimbabwe. Harare: MaCoTra Publications.

Mittelman, J. H., 1994. “Global Restructuring of Production and Migration. In: S. Yoshikazu, ed. Global Transformation: Challenges to the state system. Tokyo: United Nations University Press, 267-298.

Mlambo, A. and Raftopoulos, B., 2010. Zimbabwe's Multilayered Crisis. CMI Brief, 9(3).

Morton, C., 1994. Becoming World Class. Basingstoke: Macmillan Press.

Muda, S. and Hendry, L., 2002. Proposing a world class manufacturing concept for the make-to-order sector. InternationalJournal of Production Research, 40;(2), 353-373.

Nakajima, S., 1988. Introduction to TPM: Total Productive Maintenance. Portland: OR Productivity Press.

Ndhlovu, P., Goriwondo, W. M. and Mashingaidze, M. M., 2010. Role of Value Addition to Mineral Resources in Enhancing Economic Growth - A Case for Zimbabwe. Nairobi, icipe Science Press, 48-50.

Ohmae, K., 1990. The Borderless World: Power and Strategy in the Interlinked Economy. New York: Haper Business.

Porter, L., 2002. Six Sigma Excellence:Quality World.

Pycraft, M., Singh, H., Phihlela, K., Slack, N., Chambers, S., Harland, C., Harrison, A. and Johnston, R., 1997. Operations Management: Southern Africa Edition. London: Pitman Publishing.

Robertson, R., 1994 . Globalization, Social and Global culture. London: Sage Publications.

Salaheldin, I. S. and Riyad, E., 2007. The Implementation of World Class Manufacturing Techniques in Egyptian Manufacturing Firms. An emprircal Study. Industrial Management and Data Systems, 107;(4), 551-566.

Schonberger, R. J., 1986(a). The World Class Manufacturing: The Lessons of Simplicity Applied.MacMillan.

Schonberger, R., 1986(b). The vital elements of world-class manufacturing. International Management, 41;(5),76-78.

SIRDC, 2010. A Survey by SIRDC for UNIDO; Contribution of the Manufacturing Sector to Sustainable Development in Zimbabwe. [Online] Available at: http://www.unido.org/fileadmin/import/user

files/timminsk/rio10-ind-zimbabwe-eng.pdf [Accessed 23 september 2010].

Strategos International, 2009. World Class Manufacturing: Variations on a theme from Toyota. Newsletter of Lean Manufacturing Strategy.

The Shingo Institute, 2014. The Shingo Model. [Online] Available at: http://www.shingo.org/model/ [Accessed 12 November 2014].

Todd, J., 1995. World Class Manufacturing. Basingstoke: McGraw-Hill.

Voss, C., Blackmon, K., Chase, R., Rose, B. and Roth, A.V. (1995), 'The Competitiveness of European Manufacturing – a four country study'. 6;(1)1-25.

Wang, F.-K., 2006. Evaluating the efficiency of implementing Total Productive Maintenance. Total Quality Management and Business Excellence, 17(5),655-667.

Waters, M., 1995. Globalization. London: Routledge.

Wickens, P., 1995. The Ascendant Organization. Basingstoke: Macmillan.

Womack, J. P. and Jones, D. T., 1996. Lean Thinking: Banish Waste and Create Wealth in your Corporation. New York: Simon Schuster.

Womack, J. P., Jones, D. T. and Roos, D., 1990. The Machine That Changed the World. New York: Macmillan.

Worley, J. and Doolen, T., 2006. The role of communication and management support in a lean manufacturing implementation. Management Decision, 44;(2),228-245.

Yarrow, D., Hanson, P. and Robson, A., 2004. Made in the 21st Century: "How far have we come on the Journey to excellence?". Total Quality Management and Business Excellence, 15(5), 829-839.