



Sudan University for Science & Technology

Faculty of Graduate Studies



**The Moderating Role of Management Commitment on the
Relationship between Kaizen and Competitive Advantage:**

Case study Khartoum industrial companies

الدور المعدل لإلتزام الإدارة في العلاقة بين تطبيق الكايزن والميزة التنافسية

A thesis submitted in Partial Fulfillment for The Master Degree
in Total Quality Management & Excellence

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Dedication

In the name of Allah, most gracious, most merciful.

I dedicate this dissertation to my supportive parents, thank you for always reminding me that —nothing is impossible with God, and for your support, prayers, understanding and patience

To my brothers and sisters, thank you for your support, encouragement and inspiration.

The dedication is extended to my lovely mother and my grandmother a source of love,

Above all mentioned is Allah.

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I would also like to thank the kind and considerate personnel of the manufacturing companies in Khartoum who co-operated in this study.

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Above all mentioned is Allah.

Abstract

This research aimed to examine the relevance of kaizen practices on competitive advantage in Sudanese manufacturing companies. Kaizen practices included 5S, and just in time (JIT). Cost reduction competitive advantage was selected. A survey questionnaire was used to collect data from ten manufacturing companies from different industry types. Hierarchical regression analysis showed that kaizen practices collectively are positively and significantly affected organization competitive advantage. Just in Time proved to be positively and significantly related to competitive advantage and it impede the effect of 5S which showed no significant relationship to competitive advantage. The moderating effect of management commitment was also examined. The results of the interaction terms showed that management commitment positively and significantly moderated the relationship between Just in Time and cost reduction, while it did not significantly moderate the relationship between 5S and cost reduction competitive advantage. it is recommended that Management should look up to adopt kaizen methodology and create corporate kaizen culture to ensure synergy between the various departments of the organization and seek to train the employees on different kaizen tools. Most importantly, we contributed to the literature by examining the impact of kaizen practices on competitive advantage in committed management.

المستخلص

هدفت هذه الدراسة للتحقق من علاقة ممارسات الكايزن بالميزة التنافسية في المؤسسات الصناعية السودانية. وتضمنت الدراسة ممارسات الكايزن 5S و JIT كأبعاد لها، تم اختيار خفض التكاليف كميزة تنافسيّة. تم استخدام الاستبيان لجمع البيانات من عشرة مصانع مختلفة و تم جمع ثمانية و ثمانون استبيان للتحليل. وأظهر تحليل الانحدار الهرمي أن ممارسات الكايزن مجتمعة تؤثر بشكل إيجابي وملحوظ على الميزة التنافسية للمصنع. وأظهرت الدراسة أن ممارسة JIT يؤثر ايجابيا ومعنويا على الميزة التنافسية و أن ممارسة 5S ليس لديها تأثيرا ايجابيا ذو دلالة إحصائية معنوية على الميزة التنافسيّة. تطرقت الدراسة إلى الأثر المعدل لالتزام الإدارة . و أظهرت نتائج التفاعل بان التزام الإدارة يعدل بشكل معنوي إيجابي العلاقة بين JIT وخفض التكاليف، في حين أنه لم يظهر أثرا معدلا معنويا للعلاقة بين 5S وخفض التكاليف . توصي الدراسة الشركات بالسعي لتبني منهجية الكايزن وخلق ثقافة الكايزن لضمان التآزر بين مختلف الإدارات والسعي لتدريب الموظفين على أدوات الكايزن المختلفة. تساهم الدراسة في أدبيات البحث من خلال دراسة تأثير ممارسات الكايزن على الميزة التنافسية في ظل إدارة ملتزمة.

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CHAPTER 1:
INTRODUCTION

1.1 Introduction

This chapter entails the background of the study which captured Kaizen practice on manufacturing companies and how it can help organizations to boost competitive position. The chapter also covers statement of the problem, research objectives, research questions, scope of study, operational definition and organization of the study chapters.

1.2 Research Background

Nowadays in this dynamic and technological world, the secret of surviving for any kind of organization is to be competitive and pioneer in its products or services, which urged organizations to adopt new operational approaches that attempted to improve quality, reduce cost, enhance productivity, and improve its competitive position. Such approaches included, but not limited to, total quality management, total productive maintenance, kaizen and lean production (Al-Zu'bi, 2014).

The kaizen method has been particularly distinguished as the best methods of performance improvement within companies since the implementation costs were minimal (BOCA, 2011)

Kaizen is a philosophy of never being satisfied with what was accomplished last week or last year (Thessaloniki, 2006), it means continuing improvement involving everyone—managers and workers. It is small, low-cost, low-risk improvement that can be easily implemented (Imai, 1986). Kaizen is not a once a day, a once a month or a once a year activity. Its implementation requires an ongoing effort to

improve all aspects of your business in the light of their efficiency, effectiveness and flexibility (Bwemelo, 2014). Improvements are based on many, small changes rather than the radical changes that might arise from research and development (Imai, 1986).

Toyota is recognized as the first organization to implement this form of improvement mechanism. Many companies observing Toyota's successful use of Kaizen events seem to have been inspired to implement this improvement approach (Glover, 2012)

Kaizen process can draw on any management tool; its target can be manufacturing, maintenance, suppliers, management system or administration (Imai, 1986). Therefore, it can support any management activity including cost reduction and time management, safety management, product design, productivity improvements, zero defects, maintenance management or new product development. Continuous improvements can mean waste elimination, innovation or managing new standards (Malloch, 1997).

Kaizen essentially tries to ensure that everyone in the company continually reconsiders how the task is undertaken and whether there is a better way of doing it. Furthermore, this process of continuous improvement requires the managers to behave like a true leader in the organization, ensuring the participation of all the employees, and getting involved in all the processes of the supply chain. To do this, they must commit deeply to this work, since they are responsible for implementing the process and the most important driving force of the company (Vento et al, 2015)

1.3 Statement of the problem:

Most of the previous researches globally studied the relationship between kaizen and competitive advantage, such as (Zailani et al, 2015) which investigated the role of kaizen and its effect in maintaining a competitive position by enhancing the firm's capabilities and human competence as key competitive resources for the firms. In addition to that (Okoye et al, 2013) examined the product cost management strategies by adopting and implementing the Kaizen Costing System. Moreover (Ngothi, 2011) investigated the effects of kaizen system on the financial performance of manufacturing firms in Kenya. Beside that (Ouma et al, 2015) examined the effect of kaizen in managing cost levels in the pharmaceutical industry in Kenya. (Hashim et al, 2012) studied the association between Kaizen event and innovation performance in Malaysian automotive industry. Also (Khadri et al, 2013) investigated the relationship between kaizen practice and organization change and culture. Moreover (Alshbiel et al, 2012) study showed that there is a positive and statistically significant relationship between implementing Just In Time system and achieving competitive advantage with its three dimensions (production costs, product quality and financial performance) for industrial companies.

From all of the previous studies we noticed that they investigated the relationship between kaizen practice and organizational competitive advantage focusing on cost reduction, financial performance, innovation and organizational change and culture, but they ignore to consider the moderating effect of management commitment, more over in the same topic there is unknown to the researcher similar researches conducted in

Sudan , therefore this research will going to study the moderating effect of management commitment on the relationship between kaizen practice and organizational competitive advantage focusing on cost leadership strategy on Sudan industrial companies.

1.4 Research objectives:

1. finding the impact of kaizen practices on organization competitive advantage by using appropriate statistical analysis methods,
2. investigate the moderating effect of management commitment on the relationship between kaizen and organization competitive advantage

1.5 Research Questions:

This research should address the following questions:

1. To what extent kaizen implementation contribute in Organization Competitive advantage?
2. Does management commitment moderate the relationship between kaizen and Organization Competitive advantage?

1.6 Case and scope of the study

The research will be conducted in different type manufacturing companies that had adopted kaizen system in their operations in Khartoum, and they are: DAL group which is the largest and most diversified conglomerate in Sudan established in 1951. The Group operates across six sectors, the data for this study was collected from food and beverage sector which established in 2001 and produce grain and dairy products, in addition to coffee, tea, juice and carbonated beverages. In addition to CTC Group which is a leading multi-faceted conglomerate with over 50 years of

experience operating in Sudan across eight different sectors, the data for this study was collected from the automotive sector. Moreover Nopec natural gums factory which established 2002 and dedicated to the purchase, productions and export of Sudanese natural gum, gum hashab, and gum talha, to all countries world-wide. Also the golden arrow company which has been importing Toyota into Sudan for over 40 years. Also data was collected from Azal pharmaceuticals industries company, Giad industrial group, Massaei factory for the glue and core powder, Zuhad Glazers Factory, Abu Aziz factory for trucks, Al - Azza concrete factory.

The aim of the study will be to explore the moderating effect of management commitment on the relationship between kaizen and competitive advantage. The participants will include corporate and departments managers and quality department employees currently working in the company. Only information related to 5S and Just in time kaizen practices, cost reduction and management commitment will be collected.

1.7 Significance of the study

This research will help in addressing the existing knowledge gap in literature by exploring the moderating effect of management commitment on the relationship between kaizen and competitive advantage in manufacturing firms in Sudan, also by exploring the individual impact of kaizen practices on cost reduction as organization competitive advantage. It will also be a valuable addition to the existing

knowledge and provide a platform for further research which will be useful to academicians and scholars.

1.8 Operational definitions

1.8.1 Kaizen

Kaizen is defined as ongoing improvement involving everyone in the organization. Its process can draw on any management tool; it is an umbrella concept that embraces different continuous improvement activities on an organization including suggestions schemes, small group problem solving, statistical techniques, brainstorming, quality control circles, JIT, 5S or work study (Imai, 1986).

In this study kaizen is defined by 5S and JIT. This is consistent with (Rai, 2016) who investigated the effectiveness of 5S implementation on organizational performance, and (Sharma, 2015) who investigated the Impact of 5S Practices on Total Productive Maintenance (TPM), in addition to (Alshbiel et al, 2012) study which investigated the relationship between Just In Time system and competitive advantage.

1.8.1.1 5S

5S is a systematic technique used by organizations to improve the performance and organize the whole system, comes from five Japanese words; Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize) and shitsuke (sustain) which represent its scales.

1.8.1.2 Just in Time (JIT):

JIT is a methodology that provides the cost-effective production and delivery of only the necessary quality parts, in the right quantity, at the right time and place, while using a minimum of facilities, equipment, materials and human resources (Abdallah et al 2007).

According to (Abdallah et al 2007) JIT is measured by daily schedule adherence, equipment layout, JIT delivery by suppliers, JIT link with customer and setup time reduction.

1.8.2 Competitive advantage

Competitive advantage is seen in general, as being the use of the organization for the internal strengths points of its administrative and functional performance, so it can achieve a feature that the competitors cannot emulate or imitate. There are many perspectives in identifying competitive advantages, this study is consistent with (Ouma et al, 2015) and (Okoye et al, 2013) studies which identified competitive advantage by cost reduction.

Costs advantage relies on the ability of the company to provide service or goods at low cost compared to competitors and as a result getting a larger market share to the company (Alshbiel et al, 2012).

1.8.3 Management commitment

Top Management plays a critical role in any key business decision. Consequently, the success of any critical decision made in an organization is highly dependent on top management support and commitment. Top management must play a leading role by making available the critical resources, establishing an organization wide quality policy that is well

communicated to all stakeholders, establishing a quality management structure and managing the entire process through close monitoring and evaluation. This must be supported by an organization culture and climate of open cooperation and team work among stakeholders in quality management (Waandri, 2014)

1.9 Organization of the Study chapters

This research is organized into six chapters. Chapter one presents the research background, problem statement, objectives, it also outlines the research questions, scope of the study as well as the operational definitions. The second chapter reviews relevant literature on the concepts and core issues of the study. Chapter three presents research framework and explains how the study was conducted, methodological issues considered here include the research design, population, sample size and sampling procedure and instrumentation, sources of data and procedure for data analysis and presentation. Chapter four analyzes the results of the research. While chapter five discusses summarizes, offers recommendations and conclusion for the study.

CHAPTER 2:
LITRETURE REVIEW

2.1 Introduction

This chapter reviewed literature that had been developed by authors and researchers in the themes outlined in the study objectives. It discusses kaizen concept, 5S and JIT kaizen practices, competitive advantage concept, cost advantage and management commitment concept and the related empirical studies.

2.2 Kaizen concept

One of the important approaches that adopted by organizations to succeed is continuous improvement, which has enormous potential benefits and can lead organization to pioneer and compete in the global market by its product or service.

Kaizen is a Japanese management practices that have helped Japanese companies start from zero in the 1950s to become world class competitors in the 1980s.

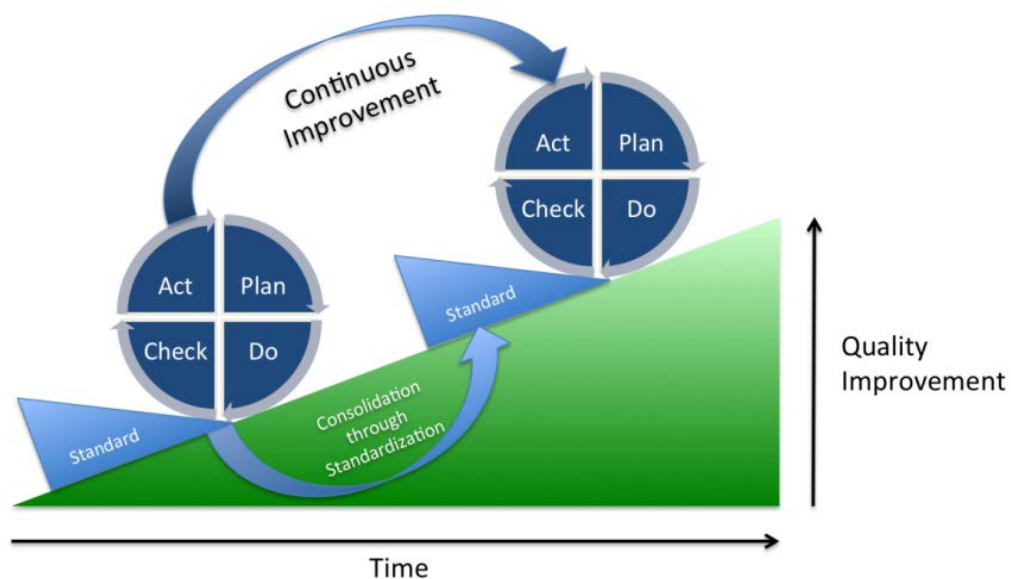
On the same note (Khadri et al, 2013) reported that kaizen is one of most important miracles of total quality management that transformed Japan to global business leader and any manager looking for the key to bring total organizational change can use this “key” to open the success story of quality for their own organization to face sustainability and growth challenges in this competitive era.

Imai, 1986 underlined the three pillars of kaizen which are:

- Housekeeping: managing work place (Gemba) best accomplished by using 5S methodology

- Waste (muda) elimination: eliminating the 7 deadly wastes or non-value adding activity, which is caused by over production, inventory, defects, motion, processing, waiting and transportation
- Standardization: Standards are set by management, but they must be able to change when the environment changes. It is a never-ending process and is better explained and presented by the PDCA cycle(plan-do-check-act), which is a tool popularized by W. Edwards Deming, a pioneer of the field, also known as Deming cycle for continuous improvement, one of the most common tools for continuous improvement.

Fig1: PDCA cycle for continuous improvement:



Source: <https://en.wikipedia.org/wiki/PDCA>

The PDCA-cycle is used to coordinate continuous improvement efforts. It emphasizes and demonstrates that improvement programs must start with careful planning, must result in effective action, and must move on again

to careful planning in a continuous cycle – the Deming’s quality cycle is never-ending. It is a strategy used to achieve breakthrough improvements in safety, quality, morale, delivery cost, and other critical business objectives (Sokovic, 2008).

Imai, 1986 signified that kaizen increases the productivity as well as result in the quality improvement, which reduces repairing work and time as well as eliminating ‘muda’ (waste of human resources, materials and time).

Malloch, 1997 outlined that kaizen is an emergent strategy which is effective in reducing cost and eliminating waste by increasing the proportion of time that employees spent in value added activities, therefore the central concern of kaizen was the management and measurement of effort with a view of eliminating slack in the system. and reported that JIT system do this by increasing manager’s capacity for surveillance, heightening employee’s responsibilities and accountabilities, peer pressure and harnessing the mental and manual skills of the shop floor to further accumulation of capital and organizational competences which lead to superior competitive advantage.

Ngothi, 2011 signified that Kaizen can be applied to any business not just production, Kaizen fundamentally differs from traditional continuous improvement processes because it is almost entirely action-based, teams are charged with both developing and implementing their solutions; they create processes or change existing processes, leaving a new process in place. And reported the underlying concepts of kaizen which is to be open minded, maintain a positive attitude, reject excuses, and seek solutions, ask why? why? why? there are no stupid questions, take action, implement

ideas immediately, don't seek perfection, that is, do what can be done now, with the resources at hand, use all of the team's knowledge.

Zailani et al, 2015 investigated the adoption of kaizen on non-Japanese-oriented social values cultures, specifically in multicultural Malaysia which is similar to Sudan culture, the study concluded that the kaizen culture does not just happen. It needs long term kaizen inculcation from top management that cascades through the organization. The level of success greatly depends on management commitment in the inculcation of kaizen as the underlying culture, the workers' involvement, their willingness to cooperate with management in introducing kaizen, backed by appropriate reward schemes, training and worker empowerment will be very relevant in attaining the kaizen culture.

On the same context (Okoye et al, 2013) reported that in addition to adopting the kaizen system, atmosphere of corporate kaizen culture is recommended, so as to enable strategy alignment since a kaizen system would entail synergy between the various departments of the organization. a kaizen culture would ensure that activities of departments, especially the production department are complemented by activities of other departments.

Khadri et al, 2013 investigated the relationship between kaizen practice and organization change and culture, the study concluded that kaizen has helped in bringing people together and build an environment of trust and love and thereby kaizen movement has made an impact on bringing positive organizational change and a conducive organizational culture for progressive human resource development in the organization.

Okoye et al, 2013 examined product cost management strategies by adopting and implementing the kaizen costing system. The principle behind kaizen costing application is on achieving small, gradual but continuous improvements in the production process at minimal cost. The results showed that implementing a kaizen costing system would provide managers with strategies for reducing material procurement and usage costs, and also reduce labor utilization cost.

Okoye et al, 2013 concluded that as organizations compete in highly turbulent environment managers are constantly seeking for cost reduction systems to implement, therefore organizations are encouraged to adopt and implement the kaizen costing system to complement existing techniques in order to strengthen their cost reduction possibilities in present day markets, more especially the manufacturing sector.

Ouma et al, 2015 affirmed the positive association between Kaizen and managing cost levels in the pharmaceutical industry in Kenya. The results have shown that there was a significant focus on continuous improvement exercises as the teams became organized and displayed an increased level of participation, the level of operator understanding of the system improved particularly with the assistance of kaizen and other lean tools and a continuous generation of ideas for improvement was received in order to facilitate further manufacturing improvements.

Ouma et al, 2015 indicated that if the top management of the organization does not support it, the progress of the kaizen implementation will be limited. It is suggested that the organization first establish senior management support and then communicate this to all, in order to understand the importance of the project.

Ngothi, 2011 investigated the effects of kaizen system on the financial performance with its dimensions profit margin, return on investment, return on assets and return on sales in manufacturing firms in Kenya, the positive effects were approved. And reported that as much as the financial performance of manufacturing companies could not be easily noticed within a short run, the long run results are the most important when using the kaizen system.

Ngothi, 2011 concluded that the introduction of kaizen system should be a process starting with training the staff members, ensuring the supervisors understand that small but gradual improvement are only possible when they bridge the bureaucratic barriers involve employees and relying on their views is very critical to the success of the Kaizen system.

Higuchi, 2016 investigated the Short and Longer Run Impacts of kaizen management training the findings affirmed the potential usefulness of management training, or kaizen training in particular, in developing industrial sector in the developing economies, and noted that it takes longer time for trained entrepreneurs to substantially change their business to improve the performance

Zailani et al, 2015 reported that there were many companies failed to achieve the success of the activity in their organizations. This is because of the internal constraints that impede the effectiveness of the implementation against the expected outcome of the activity. Two main barriers that hinder the effectiveness of the kaizen activities in Spain and Mexico are no appropriate execution and monitoring of the kaizen project or poor cooperation among employees and management and also the defiance of employees towards the changes in the working system.

Similar to that (Ngothi, 2011) reported that the biggest barrier to kaizen success is the centralization of authority and lack of cross functional cooperation. in order to increase the chances for successful kaizen adoption, two aspects of organizational culture are required: power delegation and empowerment, and high cooperation between managers, workers, customers, and suppliers.

Nevertheless, these factors are not applicable to all countries due to the fact that each particular nation may have different culture, education and knowledge in adopting the kaizen philosophy.

Some other researcher explored the individual impact of kaizen practices, here we focus on 5S and JIT practices as they were the two that adopted in this research

2.2.1 5S concept

Williams, n.d signified the advantage of implementing a 5S system which is refers to a system derives its name from the five Japanese words which define the process: seiri, seiton, seiso, seiketsu and shitsuke, and translated into: sort, set in order, shine, standardize and sustain. The guiding principles underlying the 5S system involve organization, cleanliness and standardization

Fig2: 5S methodology



Source: <https://www.kent.edu/is/pei/5s-methodology>

Sharma, 2015 highlighted the five pillars that define 5S process:

Seiri (sort): The first step of 5S is to differentiate between what you need and what you don't. what is essential and what is not. To do that effectively, you need to eliminate unneeded materials, tools or equipment from the work place.

Seiton (set in order): Once sorting has taken place, efficient storage methods must be enacted so that items are easy to locate and use, as well as put away.

Acommonly recommended way to execute this phase of the 5S process is:

1. Labeling equipment and storage locations clearly so that all employees can identify them
2. Drawing borders that can distinguish different work areas
3. Drawing lines around specific equipment and highlight the traffic and transportation lanes

4. Identifying safety hazard issues and arrange items so that possible negative effects are countered

Seiso (Scrub or Shine): This phase means thoroughly clean up clutter, fix things and checking and inspection of everything to not only clean up the work place but also to eliminate the root cause of that problem. This phase not only provides a clean work environment for working but many times broken pipes or damaged wires are found and this helps to fix safety hazards.

Seiketsu (Standardize): Standardizing involves working with the team in such a way that the team members without exception agree to implement the new way of working as the normal way of working.

Some of the points that can help better the standardized process are:

1. Write down the procedures for the first three phases and make them part of the daily routine
2. Use visual aids and visual management (shadow boards, labeled shelving, tagged bins etc.,) as much as possible because that will make abnormalities stand out
3. Schedule 5S activities as often as possible
4. Consider an official 5S agreement that outlines expectations, roles and responsibilities before starting the implementation of the program.

Shitsuke (Sustain): This is identified as the most difficult phase to be executed in the process. The root cause of this problem is that changing long-standing practices and behaviors can be difficult. It involves making 5S philosophy as the way of life in an organization and personal discipline to follow agreed upon new standards.

5S technique has been widely practiced in Japan. Most Japanese 5S practitioners consider 5S useful not just for improving their physical environment, but also for improving their thinking processes too. In Japan it is also called 'workplace management' (Bwemelo, 2014)

Williams, n.d reported that 5S process is one of the most fundamental and widely applied components of kaizen. Its application is simple, involving basic common sense; however, the advantages cannot be underestimated due to its simplicity. Once implemented a 5s system can be the stabilizing force underlying kaizen implementation. Overall workplace cleanliness created by removing waste from the work area, promotes internal organization and enhances visual communication. By reducing wasted time and materials, the productivity is increased along with safety and costs are reduced.

Sharma, 2015 investigated the impact of implementing Japanese 5S Practices on total productive maintenance (TPM). The result of this study confirmed that all 5S principles affect TPM directly or indirectly. Consequently, 5S is an effective tool which strongly supports the objectives of TPM implemented by organization to achieve continuous improvement and higher performance. 5S is the pre-step of (TPM), is a systematic approach providing the contribution of all personnel in the cleaning regime of the company, helps to organize a work place for efficiency decrease wasting and optimize quality and productivity.

Moreover (Sharma, 2015) pointed that through the proper application of 5S activities, a visible change occurs within the factory. Since it is executed in order to use the factory's area and equipments in a more efficient manner, it improves the efficiency of the company. 5S approach

forms the basis of the other improvement activities conducted at the company and leaves positive impact on the motivation of the personnel.

Rai, 2016 investigated the effectiveness of 5S implementation on organizational as well as employee's performance and their attitude towards 5s. The results showed that 5S is an effective tool for improvement of organizational performance, regardless of organization type, size, its production or its service. Consequently, 5S techniques would strongly support the objectives of organization to achieve continuous improvement and higher performance.

Furthermore (Rai, 2016) found out that more than manufacturing sector its service sectors which are not realizing the benefits of 5S in their working process. and concluded that 5S is a useful quality management tool causes to improve employee performance in any organization without any limitation on different kinds of products or services, and organizations need to consider it as a part of their organization strategy.

Sharma, 2015 underlined the key elements in successful implementation of 5S; active co-operation of personnel in 5S-related programs is the major factor in its successful implementation. In order to encourage sense of commitment among an organization's staff, top managers have to reaffirm their dedication to 5S and continuous improvement ahead of the other personnel. Furthermore, to guarantee survival of this system, 5S coordinator and steering committee must be trained to correctly understand 5S and its importance, to regularly and systematically evaluate 5S implementation, and to optimize possible inefficiencies.

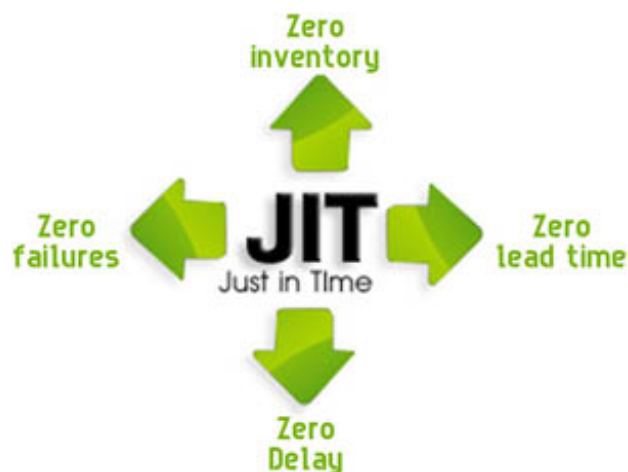
Y. C. Ennin, 2012 reported that management has the important role to facilitate and support the process by: acknowledging the importance of 5S for the organization, allowing employee's time for 5S, providing resources and infrastructure for 5S implementation, personal involvement in implementation of 5S, creating tangible and intangible rewards and recognition for improvements and promoting ongoing 5S efforts.

Sharma, 2015 discussed the most significant barriers identified which are related to lack of communication and gap between the top management and shop floor employees and also the lack of training and consciousness of this activity amongst the staff.

2.2.2 JIT concept

JIT system plays a major role in supporting organization's strategic goals as it contributes to increasing production efficiency through cutting down the costs of storage and operations, which leads to reducing the costs of end-products (Abdallah et al, 2007).

Fig 3: JIT methodology



Source:

<https://www.contalog.com/blog/inventory-management-best-practices>

JIT is dependent on the balance between the stability of the user's scheduled requirements and the supplier's manufacturing flexibility. It is accompanied through the application of specific techniques which require total employee involvement and team work" (Abdallah et al, 2007).

Alshbiel et al, 2012 cited different definitions of JIT:

"A system whose concept is inspired by the notion that nothing is produced unless it is needed". Also defined as "the production of end-products, delivery on sale time, assembly of parts in time to be placed inside the end-product, and the purchase of raw materials in time for manufacturing parts". And "access today and use tomorrow". More over JIT is viewed as "a system which became a philosophy of manufacture, or a philosophy of waste elimination within the production process, and such philosophy is inseparable". Furthermore, JIT is defined as "a technique that depends on technology to eliminate waste in the time of production, purchase time and materials in a manner that leads to lowering the costs of the production process and satisfying customer's needs in the right time with the right quantities".

Alshbiel et al, 2012 investigated the relationship between JIT and competitive advantage, The study recommended working towards enhancing infrastructure in terms of implementing JIT system, as well as holding educational and training courses for workers and employees to raise their awareness on how to apply the system, its importance and its role in lowering costs, improving quality of products and maintaining sale prices in light of the intensifying competition among companies in the market which would reflect positively on financial performance.

Alshbiel et al, 2012 indicated that it is necessary for governments to set legislations that encourage industrial companies to implement the JIT production system due to its potential positive reflections on the national economy and local communities from economic and social points of view.

Abdallah et al, 2007 investigated the relationship between JIT productions and manufacturing strategy and their impact on JIT performance.

Based on (Abdallah et al, 2007), JIT has the following determinant:

1. Daily Schedule Adherence: Measures whether there is time allotted for meeting each day's schedule including catching up after stoppages for quality considerations or machine breakdown.
2. Equipment layout: Measures use of manufacturing cells, elimination of forklifts and long conveyers, and use of smaller equipment designed for flexible floor layout, all associated with JIT.
3. JIT Delivery by Suppliers: Measures whether vendors have been integrated into production in terms of (using kanban containers), making frequent (or just-in-time) delivery and quality certification.
4. JIT Link with Customers: Measures whether the plant has applied the JIT delivery concept and the pull concept in the operational link with its customers.
5. Setup Time Reduction: Setup Times/Lot Size Reduction measures whether the plant is taking measures to reduce setup times and lower lot sizes in order to facilitate JIT.

Abdallah et al, 2007 underlined the benefits obtained by implementing JIT production: JIT not only provide companies with great increases in quality of their manufactured goods, but also help a company to cut

response time to market by as much as 90 percent. And reported the most cited JIT benefit is cost reduction.

Other benefits included: inventory reduction, increased quality and productivity levels, improved relationship with suppliers, improved customer service, reduced lead time, reduced work in process and raw materials, increased inventory turnover, downtime reduction, workspace reduction.

However, (Abdallah et al, 2007) also underlined the barriers that may potentially impede successful implementation of JIT production. The absence of senior management commitment and support was the most frequently reported reason for JIT failure. One other important barrier is local culture in countries other than Japan. Other barriers include lack of formal training/education for management and workers, and lack of cooperation with suppliers, obstacles to employee participation, schedules may be more complex because changeovers are frequent, and lack of accurate forecasting system.

2.3Competitive advantages concept:

The constant changes in business environments, the IT revolution and the scientific and technological advancements are the main reasons which led business organizations to pay attention to the competitive advantage and reconsider their competitive status (Alshbeiel et al, 2016).

Literature review indicates that numerous authors have written about competitive advantages and the ways or strategies that should be adopted by the firms to achieve them.

Alshbeiel et al, 2012 investigated the relationship between Just in time (JIT) production system and competitive advantage, the researcher

identified competitive advantage by production costs, product quality and financial performance, the results confirmed that the implementation of jit by industrial companies would lower production costs, had positive effects on product quality and had role in improving its financial performance to face the fierce competition of nowadays.

Alshbeiel et al, 2016 investigated and affirmed the effectiveness of accounting information system as a mediating variable in the relationship between information technology and competitive advantage in Jordanian commercial banks. and reported that, technologies used by Jordanian commercial banks facilitate the acquisition of information at high accuracy levels, and the speed and precision of information obtained will inevitably impact the nature, quality and cost of services provided by the bank to its clients, accordingly The more effective the system, the better competitive advantage is achieved as it helps decision makers by providing relevant information for quality, cost and time, which leads to cutting costs, boosting revenue, attracting more clients, thus increasing its market share.

In the same context, (Collins, 2003) investigated the role of human resource practices in creating sustainable competitive advantage, focused on the internal and external social networks of top management team (TMT). The distinct information capabilities created through different TMT networks, lead to reduce uncertainty, increase competitive advantages and firm performance in high technological firms. So it is suggested to provide TMT members with time, budgeted funds for relationship building and resources to increase their access to the sources of information.

Sani et al, 2012 underlined the benefits of target costing process which refers to a system of profit planning and cost management that is price led, customer focused, design centered, and cross functional. and reported that to achieve and stay ahead of competition it is imperative that every company should upgrade its processes constantly; this is achieved mainly through design and process designs and cost reductions.

Sani et al, 2012 suggested that to achieve competitive advantage firms should focus on customers and identify customer demands directly to design the right products. the quality of cost data will be consistent with the responsiveness and level of detail required at various development phases: the system will use the logic and benefits of activity-based costing. Product costs should be defined from the customer's viewpoint; they should include functionality, cost of ownership and manner of delivery.

Similar to that (Al-Awawdeh et al, 2012) explored the relationship between target costing and competitiveness at Jordanian private universities and reported that the application of target cost technique in various organizations achieve numerous objectives, it contribute in achieving satisfactory profit margin for the company by reducing the costs of production , achieve competitor sale price for its production's units to ensure and achieve its strategic objectives over the long term, it provide competing product in terms of specifications and required quality, price and time, it monitor stages of product life cycle, and after-sales service.

Al-Awawdeh et al, 2012 selected the competitive moves of the organization in five competitive advantages, differentiation and quality of the products: Adding unique characteristics for the organization's products,

The Cost of Products: the value of what companies pay to get the input of various productions

Innovation: outputs that come with the creative process,

Growth: the expansion to achieve the level of goals exceeding what has been achieved in previous years and

Alliances: forming a strategic alliance between the two organizations with their skills and capabilities to achieve the goals and objectives of the strategy, which a single organization cannot achieve alone

Al-Awawdeh et al, 2012 results indicated that: universities have a medium target costing dimensions and enjoy a medium competitive advantage and showed a significant difference in the strength of links between the dimensions of the target costing technique and the dimensions of strengthening the competitive advantage.

Abdul Rahman et al, 2012 explored and affirmed the positive impact of balanced scorecard to strengthen the competitiveness of industrial companies. And defined the enhancing of competitive advantage as: “prolonging the usefulness of the application of a unique strategy to maximize the value, through acquiring competitive advantages which are difficult for competitors to be imitated”. And reported that it requires the usage of the company strengths and unique capabilities and maintaining the current competitive advantages and developing them.

Abdul Rahman et al, 2012 identified competitive advantage by cost advantage, quality advantage and environmental advantage which is one of the modern and important competitive advantages in light of the great interest in the environment, and it is refers to the responsibility of the companies of visible or invisible environmental damages caused by its

activities. Enhancing environment advantage includes operations and environmentally friendly products and reducing waste and environmental responsibility.

Moreover (Abdul Rahman et al, 2012) recommended that, supporting and paying attention of senior management to achieve their strategic goal and strengthen competitiveness, creating comprehensive data bases that contribute in providing the necessary and appropriate data, support the application of modern management entrances such as market share, and benchmarking in addition to focus on the factor of technological development and research, because the engineering industries companies depend basically on creativity and innovation.

Zailani et al, 2015 investigated the relevance between kaizen and competitive advantage. The study found that kaizen is perceived by the top management of the organizations to be critically important to maintain its competitive position. And reported that kaizen could strive and be deployed strategically in the Malaysian cultural work place to furthering the RBV's resources – particularly human competency and capabilities which are key competitive resources for the firms.

Zailani et al, 2015 offered a set of capabilities that tend to be prevalent in successful organizations and can generate competitive advantage, and those are talent, speed, shared mindset, accountability, collaboration, learning, leadership, customer connectivity, strategic unity, innovation and efficiency. However, argued that organizational capabilities are dependent on the context of the industry and time, it will not be sustained due to erosion of that capability itself as the firm adapts to external or competitive

changes; replacement by a different capability; or being surpassed by a better capability.

As noticed there were many writer's and researcher's perspectives in identifying competitive advantages (Abdul Rahman et al, 2012) believed that it is due to the difference in the time period of each study and the different sectors that are being studied.

2.4 Management commitment:

In addition to the above researchers who emphasized to the importance of management commitment, (Asif et al, 2011) explored kaizen implementation – stages and determinants, the results showed that „management commitment“ and „kaizen approach“ emerged as the main determinants of kaizen implementation. This means that successful kaizen implementation is a function of management commitment and the approach used for kaizen implementation.

Asif et al, 2011 reported that management should use a structured approach to kaizen implementation that includes providing necessary resources, structures, and overall infrastructure for kaizen implementation. a part of this structured approach is kaizen goal setting for improvement along various dimensions of operations management. the starting point for kaizen implementation is goal setting for operational dimensions such as quality, productivity, waste reduction, cost, and delivery. at the core of this structured approach was the development of organizational culture conducive for kaizen.

Furthermore, (Asif et al, 2011) pointed the equal importance for kaizen implementation determinants, kaizen approach and management commitment, and revealed how these determinants influence kaizen

implementation. The synergy between kaizen approach and management commitment categorize kaizen implementation into:

1. Highly functional kaizen: high management commitment, high degree of kaizen-methods application
2. dormant kaizen: high management commitment; low application of kaizen methods
3. Ad hoc kaizen: low management commitment, high degree of kaizen-methods application
4. Passive kaizen: low management commitment, low degree of kaizen-methods application.

In addition to that (Thessaloniki, 2006) underlined the three kaizen pillars housekeeping, waste elimination and standardization and stated that management and employees must work together to fulfill the requirements for each category. And reported that visual management, the role of the supervisor, training and creating a learning organization are important factors to ensure the success of the activities on those three pillars.

CHAPTER 3:
RESEARCH FRAMEWORK AND
METHODOLOGY

3.1 Introduction

This chapter extends the theoretical perspective of the three research constructs presented in chapter two, encompassed resource based perspective, Kaizen/ competitive advantage relationship is discussed. The conceptual model and the hypothesis concerning the relationships among the constructs are presented. Also describes the methods and procedures used to collect and analyze data include the study design, population, sample size and sampling procedures, data collection and procedures for analysis and presentation.

3.2 Theoretical framework

Companies are in business to make a profit. There are two ways to increase profits; raise prices and lower costs. Competitive pressures often limit the ability to do the former, so companies tend to focus on cutting costs. Therefore, every step a product takes from raw materials to final assembly needs to be reviewed, to identify waste or duplication of effort and eliminate it to the maximum extent possible. A system of continuous improvement must be adopted to monitor the results on an ongoing basis. The goal is to create the perfect process (Ngothi, 2011).

The resource-based perspective has an intra-organizational focus and argues that performance is a result of firm-specific resources and capabilities. The basis of the resource-based view is that successful firms will find their future competitiveness on the development of distinctive and unique capabilities, which may often be implicit or intangible in nature. Thus, the essence of strategy is or should be defined by the firm's unique

resources and capabilities. Furthermore, the value creating potential of strategy, that is the firm's ability to establish and sustain a profitable market position, critically depends on the rent generating capacity of its underlying resources and capabilities

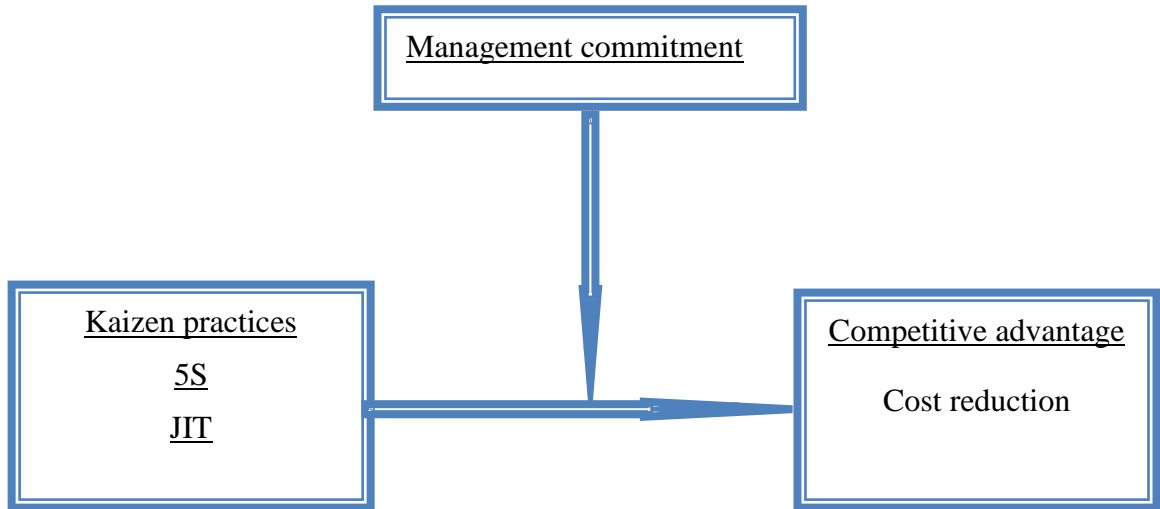
Kaizen is reported to lead to higher quality and productivity. Kaizen also helps to improve accountability and employee's commitment and by successfully implementing kaizen companies can obtain significant competitive advantage. These results have kept Kaizen as a popular topic in companies around the world and a staple in the scientific literature (Vento et al, 2015).

3.3 Conceptual framework

In this research cost reduction competitive advantage represents the dependent variable. The independent variables are the kaizen practices which are: 5S and JIT. The effects of individual determinant of kaizen practices on cost reduction were investigated. The moderating effect of management commitment on the relationship between kaizen practices and competitive advantage was explored.

The variables and their relationship are shown in figure (4):

Figure (4) Research framework



Source: prepared by the researcher based on literature review and theoretical background

3.4 Research Hypothesis:

Based on our literature review, theoretical background, and the underlying framework, we propose the following main hypotheses

1. H1: Kaizen practices have a positive association with competitive advantages.
2. H2: Management commitment moderates the relationship between kaizen and competitive advantages.

To examine the individual impact of kaizen practices on cost reduction the following hypotheses were derived from the first main hypothesis

- 1.1 H1a: 5S practice has a positive association with cost reduction

1.2 H1b: JIT practice has a positive association with cost reduction

The following hypotheses were derived from the second main hypothesis

2.1 H2a: management commitment moderates the relationship between 5S and cost reduction

2.2 H2b: management commitment moderates the relationship between JIT and cost reduction

3.5 Research design

The study adopted a descriptive survey design to collect data for analysis. Personal scanning tool (questionnaire) was used. The measurement scales for our constructs were adapted from the literature. The questionnaire included 43 items. 12 items for measuring the independent variable 5S adopted from (Priyanka Rai, 2016), 8 items for the independent variable JIT adopted from (Abdallah et al 2007) and (Awaqleh et al, 2012), 10 items to measure the dependent variable Cost reduction and 13 items for measuring the moderator variable management commitment both was adopted from (Vento et al, 2015). Respondents were required to assess their agreement or disagreement with the statements provided in the questionnaire using a five-point Likert scale.

3.6 Research population

The study targeted manufacturing companies that had adopted kaizen system in their operations in Khartoum. Therefore, the population of this study will comprise of employees of ten industrial companies, and its community consisted of corporate managers, department's managers and different department's employees for the said companies.

3.7 Sampling procedure

Respondents sample will be determined using stratified random sampling technique to ensure that different groups of a population are adequately represented in the sample.

3.8 Sample size

The sample for this study comprised corporate managers, department's managers and employees from all levels and departments of the selected organizations. This is because implementation of kaizen is everyone's business in the organization

A total of 100 samples were distributed, 93 samples were recovered; 5 disqualified as not eligible for analysis As a result, 88 samples were analyzed.

3.9 Data collection procedures

Primary data will be collected using structured questionnaires. The questionnaire was initially written in English language and then translated to Arabic. Next, the questionnaire was reviewed by two academics to ensure that content and translation was appropriate for the research purpose. Based on the received comments, the questionnaire was revised as needed. The questionnaire was distributed by the researcher to all levels of staff and then it was collected for analysis.

3.10 Data analysis technique

The data collected was coded, and analyzed through SPSS (statistical package for social sciences) version 16. Descriptive statistics such as percentages, means and standard deviation was used to describe

dependent, independent and moderating variables, and hierarchical regression analysis was used to test the hypotheses.

3.11 Reliability test of study constructs:

To evaluate the reliability of the constructs, Cronbach's α -coefficient was used. Generally, in operations management research Cronbach's $\alpha \geq 0.60$ is acceptable.

Validity of the constructs is calculated from:

$$\text{Validity} = \sqrt{\text{reliability}}$$

Table 1: summary of statistics of the study variables:

Construct	No. of questions per construct	Reliability %	validity %
5S	12	89	94
JIT	8	81.8	90.4
Cost reduction	10	81.8	90.4
Management commitment	13	94.7	97.3
Total		95.5	97.7

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

All our constructs met the recommended value of $\alpha \geq 0.60$ as shown in Table (10) indicating that the constructs are valid and internally consistent

CHAPTER 4:
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the views from respondents which were elicited to find out the moderating effect of management commitment on the relationship between kaizen and competitive advantage. Primary data were collected through questionnaires to address the objectives of the study.

Descriptive approach was used to describe the study variables. Inferential statistical analysis was used to analyze data and test hypotheses. Hierarchical regression was used to determine the correlation between the study variables and to test hypotheses.

4.2 Descriptive statistical Analysis of the Study questions:

4.2.1 Demographic information:

Table 2: summary of statistics of **demographic information:**

Variables	Frequency	Valid Percentage
Gender		
Female	25	29.8
Male	59	70.2
Missing	4	
Total	88	100.0
age		
20-30	34	39.53
31-40	33	38.37
41-50	15	17.44
>50	4	4.65
Missing	2	
Total	88	100
Educational level		
SSG	8	9.5
Bsc	51	72.6
Msc	9	10.7
PHD	5	6

Others	1	1.2
Missing	4	
Total	88	100
Job		
Employee	62	74.7
d. manager	10	12
c. manager	2	2.4
Others	9	10.8
Missing	5	
Total	88	100
Years of experience		
0-5	35	41.2
6-10	21	24.7
11-15	17	20
More than 15	12	14.1
Missing	3	
Total	88	100

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The previous table shows that male respondent occupies the first rank with 70.2%, while female respondent occupies the second with 29.8 %. It also shows that the percentage of the people aged (20-30 years) occupy first rank by 39.53%, The percentage of the people aged (31-40 years) has reached (38.37%) of the total sample size and the owners of this class came in the second place. The percentage of the people aged (41-50 years) has (17.44%) of the total sample size the percentage of people over 50 years has (4.56%) of the sample size. Moreover it shows that holders of BSc degree occupy first place with (72. 6%).The percentage of respondents who hold advanced degrees in research sample (Msc) was (10.7%) and the

holders of this class came in second place. The SSG holders come third by a ratio of (9.5 %). After that PhD holders, by a ratio of (6%) which refers to the scientific level of the respondents who can answer scientifically the phrases in the questionnaire which enhances the credibility of the statistical analysis. The final category in the ranking is the respondents who hold the other certificates with percentage of (1.2%) and represented in certificates of vocational and technical institutes. In accordance with respondent jobs it shows that the percentage of quality department employees is (74.7%) from the overall sample and occupied the first rank. The percentage department managers respondent amounted to (12%), and it is the second rank. other job categories rank third with (10.8%). the last is corporate managers with (2.4%). From the above mentioned ratios, notice that most of the respondents have related scientific specialization which enables them to answer the questionnaire as required which enhances the credibility of this tool. And it also shows that the percentage of the years of experience up to 5 amounted to (41.2%) and occupied the first rank. Whereas the percentage of years of experience ranging from (6-10 years) amounted to (24.7%) and occupied the second rank. The percentage of respondents whose years of experience range from (11-15) amounted to (20%), whereas the respondents with years of experience more than 15 amounted to (14.1%). From the previous percentages we notice that 58.8% of the sample exceeds 5 years of experience, which means that the majority of respondents have sufficient experience which enables them to answer the questionnaire that enhances the credibility of this tool.

4.2.2 Summary of statistics of study variables:

To range the results into three levels (week, average and high average response the following equation were applied:

Range= (the highest average value- the lowest average value) / (number of levels): $(5-1) / (3) = 1.33$

Therefore, the results will be as the following:

(1 - 2.33) results represent a week average response rate (W).

(2.34 - 3.67) results represent a medium average response rate (M).

(3.68 - 5) results would be a high average response (H).

4.2.2.1 5S variable questions:

Table 3: summary of statistics of the 5S variable questions:

statements	N	Mean	Standard deviation	Result
Sort:	86	3.8256	.96029	High
All employees at their respective workplaces or offices contribute in removing unnecessary items which are not required in day to day tasks.	86	3.8256	.96029	High
Set in order:	88	3.8125	.83651	High
All the temporary repairs items are conveniently available at the work place.	88	3.7159	1.00515	High
All the tools and machines are placed on designated places.	83	3.8795	1.00484	High
All the materials are properly placed on racks & marked for identification.	87	3.8276	1.11237	High
Shine:	88		.79950	High
		3.7936		

Always all the temporary repairs are handled	86	3.7093	.96852	High
The workplace is always clean and free from any clutter.	86	3.7326	1.11064	High
Appointed personnel are given responsibilities to ensure that tools and machines are in good condition	86	3.9070	1.01318	High
Standardize:	87	3.6437	1.01130	medium
All routines for cleaning are scheduled with a system	87	3.6437	1.01130	medium
Sustain:	88	3.5758		medium
All the instructions and procedures are regularly updated and published on designated billboards, signage areas that are visible to personnel	87	3.7126	.83722 1.09871	High
In case of any problems/challenges there is SOP at place to handle it	87	3.6552	1.02103	medium
Employees are trained and committed to the 5S	85	3.4824	1.04211	medium
There is a top management policy of how to handle 5S issues	86	3.4186	1.01129	medium
5S		3.7022	.70660	High

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The Previous table indicated that the first question represent sort, the second, third and fourth questions represent set in order, the fifth, sixth and seventh questions represent shine, all the three determinant had high average response rate, the eighth question represent standardize while the

ninth, tenth, eleventh and twelfth represent sustain both of them had medium average response rate.

The results indicate that companies were adopting 5S kaizen practice with high average response of 3.70.

4.2.2.2 JIT variable questions:

Table 4: summary of statistics of the JIT variable questions:

Statements	N	Mean	Standard deviation	Result
Daily schedule adherence:	88	3.7500	.83391	High
Our daily schedule is reasonable to complete on time.	88	3.8409	.90828	High
We build time into our daily schedule to allow for any unexpected production stoppages.	87	3.6667	.93593	Medium
Equipment layout:	86	3.7907	.85566	High
We have grouped our machine according to the product family to which they are dedicated to support JIT production flow.	86	3.7907	.85566	High
JIT delivery by suppliers:	86	3.2674	1.16240	Medium
We can depend upon on-time delivery from our suppliers.	86	3.2674	1.16240	Medium
JIT link with customers:	88	3.5966	.82649	Medium
We always deliver on time to our customers.	86	3.6163	.97218	Medium
We can adapt our production schedule to sudden production stoppages by our customers.	87	3.5862	.97111	Medium

Setup time reduction:	88	3.7330	.83373	High
We are aggressively working to lower setup times in our plant.	88	3.8182	.94133	High
all production stages are completed on time	86	3.6395	1.02799	medium
JIT		3.6469	.66787	medium

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The Previous table indicates that the first and second statements represent daily schedule adherence, the third statement represent equipment layout both with high average response rate, the fourth statement represent JIT delivery by suppliers, the fifth and sixth statements represent JIT link with customers, both of them with medium average response rate. While the seventh and eighth statements represent setup time reduction with high average response rate.

The results also indicate that companies were adopting JIT kaizen practice with medium average response of 3.65.

4.2.2.3 Cost reduction variable questions:

Table 5: summary of statistics of cost reduction variable questions:

Statements	N	Mean	Standard deviation	Result
There is Reduction in the percentage of defective products	87	3.1379	1.32219	medium
There is Decreases in unit manufacturing costs	86	3.1977	1.01541	medium
There is Reduction in the time elapsed between the reception of the order and the delivery to the customer as much as	86	3.4535	1.08093	medium

possible.				
There is Reduction of material handling distance	84	3.3333	.97355	medium
There is Reduction of waste in areas such as inventories, transport and movement of workers.	84	3.3810	1.16065	medium
There is Reduction of waste in waiting times	85	3.1882	1.14947	medium
There is Reduction of steps in the production process.	85	2.9765	1.15446	medium
There is Decrease in failures of equipment and tools.	85	3.4706	1.12956	medium
There is Reductions in design cycles.	82	2.9634	1.09370	medium
There is Reductions in operational cycles.	84	3.0357	1.09155	medium
Cost reduction		3.2157	.67559	medium

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The Previous table indicates that all of the cost reduction questions had medium average response rate.

The results indicate that companies enjoy a medium cost reduction competitive advantage with an average response rate of 3.21

4.2.2.4 Management commitment variable questions:

Table 6: summary of statistics of management commitment variable questions:

Statements	N	Mean	Standard deviation	Result
management clearly communicate the purpose of the Kaizen event, provide good training, and promote Kaizen as a way to easily and thoroughly solve the problem	87	2.9425	1.23285	medium
management strive to set the example through a positive attitude of ethical working standards and encourage questions	88	3.4318	1.19188	medium
management successfully promote respect within the Team	86	3.5581	1.20396	medium
management motivate people through enthusiasm to learn	87	3.1954	1.22796	medium
Management make sure people achieve their full potential	88	3.1364	1.14653	medium
management keep people engaged	87	3.0805	1.37434	medium
management promote healthy competition between Team members	88	3.0114	1.24563	medium
management reward members for their hard work	88	3.1818	1.20864	medium
Management request members to be in future events	87	2.9540	1.18034	medium
management follow up, teach, and support subordinates	84	2.8214	1.26263	medium
management try to determine root cause, when steps in the Kaizen process did not go well	88	2.8864	1.26338	medium

management encourage creativity using the tools of the Kaizen process	88	2.9091	1.27429	medium
Management commitment		3.0900	.93783	medium

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The Previous table indicated that all of the management commitment questions had medium average response rate

The results indicate that Management commitment toward kaizen had medium average response rate of 3.09.

4.3 Inferential Statistical Analysis of the Study Variables

Hierarchical regression analysis was used to test the hypotheses, multicollinearity test was conducted which is a common problem happened when two or more of the predictors in a regression model are moderately or highly correlated and the results showed that (VIFs values ranged between 1.598-1.880) which is less than 10 and that means there is no multicollinearity symptoms in the research models.

We used three models to test our hypotheses. In the first model, 5S and JIT were entered in order to test their effects on cost reduction (H1a, H2a hypotheses). In the second model, we added management commitment, to 5S and JIT. In the third model, we added the interaction of 5S, JIT with management commitment in order to test the interaction effects. The addition of the interaction effects resulted in high multicollinearity, therefore, we centered the independent variables and the moderating variable at the mean and recreated the two-way interaction terms. The VIF

diagnostics showed no multicollinearity problems and the highest VIF value was 2.171. table 11 shows the hierarchical regression analysis of cost reduction

Table 7: hierarchical regression analysis of cost reduction:

Variables	Model 1	Model 2	Model 3
Constant	1.061*	1.087*	1.035*
Independent variables			
5S	.040	.021	.092
JIT	.519*	.481*	.419*
Moderating variable			
Management commitment		.084	.117
Interaction effects			
5SxMC			.214
JITxMC			-.322*
R ²	.296*	.300	.349
Adjusted R ²	.279*	.275	.309
R ² change		.004	.049
F	17.429*	11.726*	8.590*
F change		.521	3.019

*≡ Sig ≤ .05

Source: prepared by the researcher based on the results of the statistical analysis of the questionnaire

The results of the three models showed that they are statistically significant

The first model showed that kaizen practices collectively positively and significantly contributed to the explanation of the variance in cost reduction (F-value of 17.429 sig < .001). Coefficient of determination, R², indicated that 29.6% of the variance in cost reduction explained by the kaizen practices. The adjusted R² of 0.279 in the first regression model

indicated that the R^2 was slightly decreased due to the number of independent variables and sample size:

To test the individual effect of each kaizen practice on cost reduction, standardized beta weights (coefficients) were reported with their corresponding significance:

The results showed that 5S kaizen practice was not significantly related to cost reduction ($\text{sig} > .05$) where JIT kaizen practice was positively and significantly related to cost reduction ($\text{sig} < .05$); therefore, hypotheses H1a was rejected, and hypotheses H2a was accepted.

The addition of management commitment in the second regression model did not result in significant change of the variance in cost reduction ($\text{sig} > .05$).

In the third model, the addition of interaction effects collectively did not result in significant change of the variance in cost reduction ($\text{sig} > .05$), however, the interaction results showed that management commitment significantly and positively ($\text{sig} < .05$) affected the relationship between JIT kaizen practice and cost reduction. The effect of 5S and management commitment interactions was insignificant ($\text{sig} > .05$). Hypothesis H1b was rejected while hypotheses H2b was accepted

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter presents a summary of the research process and the major findings from the study. It then discusses the results and highlighted the research limitations. Also, this chapter makes recommendations for future research that were identified as a result of this study and draws conclusions.

5.2 Research objectives

The objectives of this research were to find the impact of kaizen practices on organization competitive advantage and to investigate the moderating effect of management commitment on the relationship between kaizen and competitive advantage.

5.3 Key Findings

The results affirmed the positive and significant effect of kaizen practices collectively on cost reduction.

The results of the individual impact of kaizen practices showed that:

5S showed no significant impact on cost reduction. While JIT significantly and positively impact cost reduction competitive advantage.

Our study highlighted how management commitment affects kaizen - competitive advantage relationship.

The results of the interaction terms revealed that the effect of JIT on competitive advantage increased and enhanced with higher levels of management commitment.

The interaction effects between 5S kaizen practice and management commitment was insignificant.

5.4 Results discussion

The implementation level of kaizen practices in Sudan was found to be above average. This result should not be seen surprising, because Sudan is in the process of transforming its industry to be globally competitive, by the efforts in enhancing its quality programs through continuous improvement and total quality approach (Ahmed, 2016)

The results provided empirical evidence of the positive and significant effect of kaizen practices collectively on cost reduction. This consisted with other studies (Zailani, et al (2015), Okoye et al (2013), Stanley (2011), Ouma et al (2015), Hashim, et al (2012), Khadri (2013), ALshbiel et al (2012).

The results of the individual impact of kaizen practices showed that:

5S showed no significant impact on cost reduction despite its numerous benefits and its visible changes that caused by its proper implementation. That may be for the reason that JIT effect impede the effect of 5S implementation and the fact that 5S is seen as fundamental pre requisite or pre step that can pave the way for any appropriate continuous improvement process as cited by (Priyanka, 2016) and (Sharma, 2015)

Our study highlighted how management commitment affects kaizen - competitive advantage relationship.

The results of the interaction terms revealed that the effect of JIT on competitive advantage increased and enhanced with higher levels of management commitment.

The interaction effects between 5S kaizen practice and management commitment was insignificant.

5.5 Theoretical and practical implication

Organizations are encouraged to adopt and implement Kaizen methodology to complement existing techniques in order to face fierce competition by cost advantage product.

5S implementation is very important step in implementing kaizen and it should be adopted by organizations to eliminate wastes and ensure safe and well organized work place that facilitate implementation of other kaizen activity.

JIT has numerous benefits and management should exploit advantage of JIT practices in order to improve their manufacturing competitiveness.

Management should be interested and trained to create an atmosphere of corporate Kaizen Culture, to ensure synergy between the various departments of the organization and consequently achieve the required outcome.

Management should focus on training employees to let them understand kaizen related tools and should motivate, reward and encourage employees for better performance.

5.6 Research limitations

Some respondents might be unwilling to give accurate information for fear that the information may be sensitive or confidential bearing in mind the level of importance attached to quality.

Moreover, the research explored only manufacturing Companies in Khartoum state and as results the findings can't be generalized to whole Sudan.

5.7 Recommendation for future research

Our research also has some limitations that should be considered alongside with the interpretation of the reported findings, and which may suggest directions for future research.

Firstly, we focused on 5S and JIT kaizen practices. Future research should extend our model to include other kaizen practices such as suggestions schemes, brainstorming, quality control circles... etc.

Secondly, we included only one moderating variable in our model. Several other moderating variables may affect the proposed relationship. Future research may investigate the moderating effect of other variables such as training, employee's involvement and empowerment.

Thirdly, we focused only on cost reduction. Future research may explore other competitive advantage aspects such as, differentiation, financial or innovation competitive advantage.

5.8 Conclusion

This research is conducted to investigate the impact of kaizen practices on competitive advantage in Sudan manufacturing companies. The moderating effect of management commitment on this relationship was examined. We focused on core 5S and JIT kaizen practices and cost reduction competitive advantage.

Descriptive research design was used to conduct the study. The target population consisted of employees and management in the selected organization. The total sample size was 88.

Stratified random sampling technique was used to select the respondent. Questionnaire was designed and used to collect data for the study. Data collection lasted for three weeks. The data were edited, coded, presented and analyzed using statistical tools such as percentages, frequency tables, were used to summarize the data and the results were presented in the form of tables for discussion which aided in answering the research questions.

The results affirmed the positive and significant effect of kaizen practices collectively on cost reduction.

The results of the individual impact of kaizen practices showed that

5S showed no significant impact on cost reduction. While JIT significantly and positively impact cost reduction competitive advantage. Our study highlighted how management commitment affects kaizen - competitive advantage relationship.

The results of the interaction terms revealed that the effect of JIT on competitive advantage increased and enhanced with higher levels of management commitment.

The interaction effects between 5S kaizen practice and management commitment was insignificant.

From the above findings it is recommended that management should look up to adopt kaizen methodology and create corporate kaizen culture to ensure synergy between the various departments of the organization and seek to train the employees on different kaizen tools

We contributed to the literature in this regard by examining the moderating role of management commitment i.e the interaction effect of each individual kaizen practice with management commitment. And also by examining the individual effect of 5S and JIT on competitive advantage.

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					الموظفين مدربين و ملتزمين بال5S
					لدينا سياسة للإدارة العليا حول كيفية التعامل مع قضايا ال 5S
					JIT .2
					الجدول الزمني للإنتاج اليومي معقول ويمكن اتمامه في الوقت المحدد
					عند تحديد الوقت للجدول الزمني اليومي يؤخذ في الاعتبار كل مؤثر
					تجمع الآلات وفقا لعائلة المنتج التي تختص به لدعم تدفق الانتاج في الوقت المناسب
					يمكن الاعتماد علي التسليم في الوقت المناسب من الموردين دائما ما يتم التوصيل في الوقت المناسب لعملائنا
					يمكن تكيف الجدول الزمني للإنتاج مع التوقف المفاجئ من قبل العملاء
					نعمل بقوة لخفض زمن الاعداد للمعدات في مصنعنا
					يتم الانتهاء من جميع مراحل الانتاج في الوقت المحدد
					المحور الثاني: الفائدة التنافسية تقليل التكلفة:
					يتم تخفيض نسبة المنتجات المعيبة
					يوجد انخفاض في تكاليف تصنيع الوحدة
					يتم تخفيض الوقت المنقضي بين استقبال الطلب وتسليمه للعميل قدر الإمكان
					يتم تقليل مسافة نقل المواد
					يتم التقليل من الهدر في المخزونات والنقل وحركة العمال
					يتم التقليل من الهدر في أوقات الانتظار
					يتم تقليل الخطوات في عملية الانتاج
					يتم خفض اعطال المعدات و الادوات
					يوجد تخفيضات في دورات التصميم
					يوجد تخفيضات في الدورات التشغيلية
					لمحور الثالث: التزام الادارة
					تقوم الادارة بتوضيح الغرض من استخدام الكايزنوتوفر التدريب الجيد وتروج الكايزن كوسيلة لحل المشاكل بسهولة ودقة
					تسعي الادارة لتحقيق الوضع الامثلن خلال السلوك الايجابي لمعايير العمل الاخلاقية و تشجيع الاسئلة

					تروج الادارة ثقافة الاحترام ضمن الفريق
					تحفز الادارة الموظفين من خلال حماسها نحو التعلم
					تعمل الادارة على تحقيق امكانيات الموظفين الكاملة
					تحرص الادارة علي الارتباط بين الموظفين
					تتناكدالادارة ان لكل شخصاهداف واضحة تتابع باستمرار
					تعزز الادارة المنافسة الصحية بين اعضاء الفريق
					تكافئ الادارة الاعضاء علي العمل الشاق
					تطلب الادارة من الاعضاء المشاركة في احداث مستقبلية
					الادارة تتابعالتعليم وتدعم المرؤسين
					تحاول الادارة تحديد السبب الاساسي عندما لاتسير عملية الكايزن كما ينبغي
					تشجع الادارة الإبداع باستخدام أدوات عملية كايزن

Appendix 2: Reliability test

5S reliability statistics:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.891	.890	12

JIT reliability statistics:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.814	.818	8

Cost reduction reliability statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.816	.818	10

Management commitment reliability statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.947	.947	13

Appendix 3: frequencies:

gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	25	28.4	29.8	29.8
	male	59	67.0	70.2	100.0
	Total	84	95.5	100.0	
Missing	System	4	4.5		
	Total	88	100.0		

age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	34	38.6	39.5	39.5
	31-40	33	37.5	38.4	77.9
	41-50	15	17.0	17.4	95.3
	>50	4	4.5	4.7	100.0
	Total	86	97.7	100.0	
Missing	System	2	2.3		
	Total	88	100.0		

educational level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ssg	8	9.1	9.5	9.5
	bsc	61	69.3	72.6	82.1
	msc	9	10.2	10.7	92.9
	phd	5	5.7	6.0	98.8
	others	1	1.1	1.2	100.0

	Total	84	95.5	100.0	
Missing	System	4	4.5		
	Total	88	100.0		

job

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	employee	62	70.5	74.7	74.7
	d. manager	10	11.4	12.0	86.7
	c. manager	2	2.3	2.4	89.2
	others	9	10.2	10.8	100.0
	Total	83	94.3	100.0	
Missing	System	5	5.7		
	Total	88	100.0		

years of experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	35	39.8	41.2	41.2
	6-10	21	23.9	24.7	65.9
	11-15	17	19.3	20.0	85.9
	more than 15	12	13.6	14.1	100.0
	Total	85	96.6	100.0	
Missing	System	3	3.4		
	Total	88	100.0		

Appendix 4: descriptive statistics:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
All employees at their respective workplaces or offices contribute in removing unnecessary items which are not required in day to day tasks.	86	1.00	5.00	3.8256	.96029
All the temporary repairs items are conveniently available at the work place.	88	1.00	5.00	3.7159	1.00515
Always all the temporary repairs are handled	86	1.00	5.00	3.7093	.96852
All the tools and machines are placed on designated places.	83	1.00	5.00	3.8795	1.00484
All the materials are properly placed on racks & marked for identification	87	1.00	5.00	3.8276	1.11237
Appointed personnel are given responsibilities to ensure that tools and machines are in good condition.	86	1.00	5.00	3.9070	1.01318
The workplace is always clean and free from any clutter.	86	1.00	5.00	3.7326	1.11064
All routines for cleaning are scheduled with a system	87	1.00	5.00	3.6437	1.01130
All the instructions and procedures are regularly updated and published on designated billboards, signage areas that are visible to personnel	87	1.00	5.00	3.7126	1.09871
In case of any problems/challenges there is SOP at place to handle it	87	1.00	5.00	3.6552	1.02103
Employees are trained and committed to the 5S	85	1.00	5.00	3.4824	1.04211
There is a top management policy of how to handle 5S issues	86	1.00	5.00	3.4186	1.01129
Our daily schedule is reasonable to complete on time.	88	1.00	5.00	3.8409	.90828
We build time into our daily schedule to allow for any unexpected production stoppages.	87	1.00	5.00	3.6667	.93593
We have grouped our machine according to the product family to which they are dedicated to support JIT production flow.	86	2.00	5.00	3.7907	.85566

We can depend upon on-time delivery from our suppliers.	86	1.00	5.00	3.2674	1.16240
We always deliver on time to our customers.	86	1.00	5.00	3.6163	.97218
We can adapt our production schedule to sudden production stoppages by our customers.	87	1.00	5.00	3.5862	.97111
We are aggressively working to lower setup times in our plant.	88	2.00	5.00	3.8182	.94133
all production stages are completed on time	86	1.00	5.00	3.6395	1.02799
There is Reduction in the percentage of defective products	87	1.00	5.00	3.1379	1.32219
There is Decreases in unit manufacturing costs	86	1.00	5.00	3.1977	1.01541
There is Reduction in the time elapsed between the reception of the order and the delivery to the customer as much as possible.	86	1.00	5.00	3.4535	1.08093
There is Reduction of material handling distance	84	1.00	5.00	3.3333	.97355
There is Reduction of waste in areas such as inventories, transport and movement of workers.	84	1.00	5.00	3.3810	1.16065
There is Reduction of waste in waiting times	85	1.00	5.00	3.1882	1.14947
There is Reduction of steps in the production process.	85	1.00	5.00	2.9765	1.15446
There is Decrease in failures of equipment and tools.	85	1.00	5.00	3.4706	1.12956
There is Reductions in design cycles.	82	1.00	5.00	2.9634	1.09370
There is Reductions in operational cycles.	84	1.00	5.00	3.0357	1.09155
management clearly communicate the purpose of the Kaizen event, provide good training, and promote Kaizen as a way to easily and thoroughly solve the problem	87	1.00	5.00	2.9425	1.23285
management strive to set the example through a positive attitude of ethical working standards and encourage questions	88	1.00	5.00	3.4318	1.19188
management successfully promote respect within the Team	86	1.00	5.00	3.5581	1.20396
management motivate people through enthusiasm to learn	87	1.00	5.00	3.1954	1.22796
Management make sure people achieve their full potential	88	1.00	5.00	3.1364	1.14653
management keep people engaged	87	1.00	5.00	3.0805	1.37434
Management make sure each person has clear goals that followed-up on frequently	86	1.00	5.00	3.0349	1.19260
management promote healthy competition between Team members	88	1.00	5.00	3.0114	1.24563
management reward members for their hard work	88	1.00	5.00	3.1818	1.20864
Management request members to be in future events	87	1.00	5.00	2.9540	1.18034
management follow up, teach, and support subordinates	84	1.00	5.00	2.8214	1.26263

management try to determine root cause, when steps in the Kaizen process did not go well	88	1.00	5.00	2.8864	1.26338
management encourage creativity using the tools of the Kaizen process	88	1.00	5.00	2.9091	1.27429
Valid N (listwise)	56				

Appendix 5: regression:

Variables Entered/Removed^b

Model	Variables Entered	Variables Removed	Method
1	JIT, 5S ^a	.	Enter
2	management commitment ^a	.	Enter
3	cJITxMC, cfivsxC ^a	.	Enter

a. All requested variables entered.

b. Dependent Variable: cost reduction

Model Summary^d

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.544 ^a	.296	.279	.57650	.296	17.429	2	83	.000
2	.548 ^b	.300	.275	.57817	.004	.521	1	82	.472
3	.591 ^c	.349	.309	.56444	.049	3.019	2	80	.054

a. Predictors: (Constant), JIT, 5S

b. Predictors: (Constant), JIT, 5S, management commitment

c. Predictors: (Constant), JIT, 5S, management commitment, cJITxMC, cfivsxC

d. Dependent Variable: cost reduction

ANOVA^d

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.585	2	5.793	17.429	.000 ^a
	Residual	27.585	83	.332		
	Total	39.171	85			
2	Regression	11.759	3	3.920	11.726	.000 ^b
	Residual	27.411	82	.334		
	Total	39.171	85			
3	Regression	13.683	5	2.737	8.590	.000 ^c
	Residual	25.487	80	.319		
	Total	39.171	85			

a. Predictors: (Constant), JIT, 5S

b. Predictors: (Constant), JIT, 5S, management commitment

c. Predictors: (Constant), JIT, 5S, management commitment, cJITxMC, cfivsxMC

d. Dependent Variable: cost reduction

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	1.061	.400		2.653	.010
	5S	.041	.118	.040	.347	.729
	JIT	.546	.121	.519	4.519	.000
2	(Constant)	1.087	.403		2.699	.008
	5S	.021	.121	.021	.178	.859
	JIT	.506	.133	.481	3.798	.000
	management commitment	.062	.086	.084	.722	.472
3	(Constant)	1.035	.394		2.627	.010
	5S	.094	.124	.092	.759	.450
	JIT	.441	.133	.419	3.308	.001
	management commitment	.086	.088	.117	.984	.328
	cfivsxMC	.230	.143	.214	1.609	.112
	cJITxMC	-.363	.148	-.322	-2.454	.016

a. Dependent Variable: cost reduction