

Implementing the SCOR Model Best Practices for Supply Chain Improvement in Developing Countries

Fasika Bete Georgise^{1,2,3}, Klaus-Dieter Thoben² and Marcus Seifert²

¹*International Graduate School for Dynamics in Logistics (IGS), University of Bremen*

²*Bremer Institut für Produktion und Logistik GmbH - BIBA, Hochschulring 20, D-28359 Bremen, Germany*

³*School of Industrial and Mechanical Engineering, Hawassa University, Hawassa, Ethiopia*

{geo, tho, sf}@biba.uni-bremen.de

Abstract

Firms in developing countries are adopting best practices to improve their organizational performance. They have been focusing on achieving productivity gains in their operations by implementing best practices. However, these efforts could not lead to expected benefits. The main reasons for failure in adopting the best practice which it face new environmental scenarios different for which it was created. This paper explores the best practices implementation and challenges encountered during the process of adoption. The research methodology includes a literature review, questionnaire survey and semi-structured interview. The Ethiopian manufacturing firms were sampled for empirical study. The research survey was based on SCOR model best practices. The findings show that most of the respondent firms have shown interests and put efforts to implement some of them. But, the results were below the expectations. The implementation of the best practice has faced different challenges and unavailability of the required enablers. Therefore, there is a need for developing countries to analyze their scenarios and then adapt the best practices that consider their real situations.

Keywords: best practice, developing country, manufacturing industry, SCOR model

1. Introduction

The manufacturing industry in developing countries is facing fierce challenges from both local and international competitors into the marketplace. For these challenges, manufacturers must be able to understand their customers to satisfy better than their competitors and improve their supply chains dynamically. Therefore, companies are pressurized to build their managerial and technical capabilities so that they should retain their markets and integrate in the global business. Due to the recent trend and practices that suggest improving the whole supply chain members as one of the tools for competitiveness, for that the manufacturing industry in developing countries (MIDC) needs to model, measure, benchmark, implement best practices and devise a mechanism for improvement the whole supply chain. The experience of firms in developed countries in modelling and improving the global supply chains can be used as input to benefits the manufacturing industry in the developing countries if the experience transferred and implemented appropriately. Currently, many MIDC are undergoing both technological modernization and transition. In order to facilitate the changes, they have

started program to improve their industry performance and competence using different modern management philosophies and techniques such as Total Quality Management (TQM), Just-In-Time (JIT), Flexible Manufacturing System (FMS), Performance Measurement Systems (PMSs), Balanced Scorecard (BSC), Business Process Reengineering (BPR) and Lean Manufacturing [1-3]. However, it is not sure that innovations best practices can be applied in the different context and environment of less developed countries. The attempt to implement might face a variety of problems that could not occur in developed countries. On the other hand, these modern tools are becoming increasingly expensive to build from scratch and implement in the developing country's scenario. Consequently, an excellent experience from the developed world that has shown success stories could be transferred for application that satisfies some of the requirements, then extended, tailored for local developing country's requirements [4-5].

Recently, academic and practical researches are focused on how manufacturers could use the different management techniques and practices to react to these challenges [6]-[11]. Supply Chain Management (SCM) is one of the foremost solutions to leverage manufacturers' ability to compete and developing a collaborative relationship. A company can propose many initiatives to improve their supply chain at different levels. It is inevitable for the firm to screen and evaluate the different initiatives before implementing the initiatives. Managers' were focus on SCM practices by classifying them as- the best, the good, the bad, and the worst [12-13]. The word 'best practices' appears in the advanced SCM because it benefits manufacturing industries in their improvement activities. The Supply Chain Council was developed a Supply Chain Operations Reference (SCOR) model that incorporates the best-practice that helps this paradigm shift [13]. However, the MIDC is facing challenges in adopting the best practice to their business processes.

The rest of this research results is structures as follows. In section two describes SCOR model as best practice tool. Transferability of best practices to developing country firms was discussed in section four. In section five we explain research methodology. The research results and analysis was presented in section six. The next section proposes the adaptation steps for further improvements of the whole supply chains that involve firms in developing countries. The last section summarizes and concludes the research findings.

2. Best Practice from SCOR Model

SCOR model is generic and a quasi-standard model to the description and analysis of supply chains. The SCOR model uses three well-known individual techniques: business process modeling, benchmarking performance and best practice analysis and turned into an integrated approach. It comprises a complete set of supply chain performance metrics, industry best practices, and enabling systems. The current version (V.10) of this normative model includes more than 200 described process elements, 550 defined performance metrics and 500 leading business practices, which are hierarchically organized on levels [13]. The SCOR model helps to identify the gaps and inefficiencies in processes. The best practices fix the inefficiencies with the leading practices and tools from different successful practices.

A best practice is a unique way to configure a process or a set of processes. The uniqueness can be related to the automation of the process; a technology applied to the process; special skills applied to the process, a unique sequence for performing the process, or a unique

method for distributing and connecting processes between organizations. The SCOR model defines “best practice as a current, structured, proven and repeatable method for making a positive impact on desired operational results”. SCOR best practices have been collected from diverse industries by SCOR practitioners. SCOR recognizes that several different types of practices exist within any organization: leading or emerging practices; best practices; common practices; and poor practices. What’s important to understand is that different practices have different performance expectations? The classification of a practice will vary by industry. For some industries, a practice may be common, whereas the same practice may be considered a leading or best practice in another industry [13]. Best practice analysis follows the benchmarking activity that should have measured the performance of the supply chain processes and identified the main performance gaps. It is understood that not all best practices will yield the same results for all industries or supply chains.

Best Practices of the SCOR model are meant to give concrete approaches for the execution of processes that have been set successfully in practice and were collected by the members of the SCC. The Best Practice Section of the SCOR-model can be divided into 3 parts: Best Practices of SCOR in general, Best Practices of Green SCOR and Best Practices of SC-Risk Management, firstly appearing in Version 9.0 of the SCOR-model. Table 1 displays the total number of Best Practices, to get an overview of the depth of Best Practices mentioned in the SCOR-model.

Table 1. Total Number of Best Practices [13]

	Best Practices of SCOR in General	Best Practices of Green SCOR	Best Practices of Supply Chain Risk Management
Total Number of Best Practices	422	98	11

Each part contains several Best Practices, which are listed in alphabetical order and the processes they can be applied on. Thematically they deal with different ways of improving a process. For example there are suggested complex management methodologies such as Six Sigma, Lean Management and Kanban, technological tools like Electronic Document Management, Customer Relationship, Management and even concrete advises such as “Packaging Operation is an Integral Part of the Overall Production Process” or “Single Point of Contact for All Order Inquiries (including order entry)”.

The SCOR model three elements are integrated into a single framework. The performance metrics, for example, are linked to the processes to allow root-cause analysis of performance gaps. Similarly, the best practices are linked to the metrics and the processes; this allows users to identify implementation requirements and target performance improvements. Together, they form a framework that supports a relatively quick, consistent method for defining supply chain processes and can then be used to manage and improve performance. For each process in the SCOR model, there are recommended looked-up corresponding best practice for implementation. An example of associations for process template “sM2.3: Produce & Test” is shown in Figure 1. Industry-proven best practices are associated with each activity available in the model.

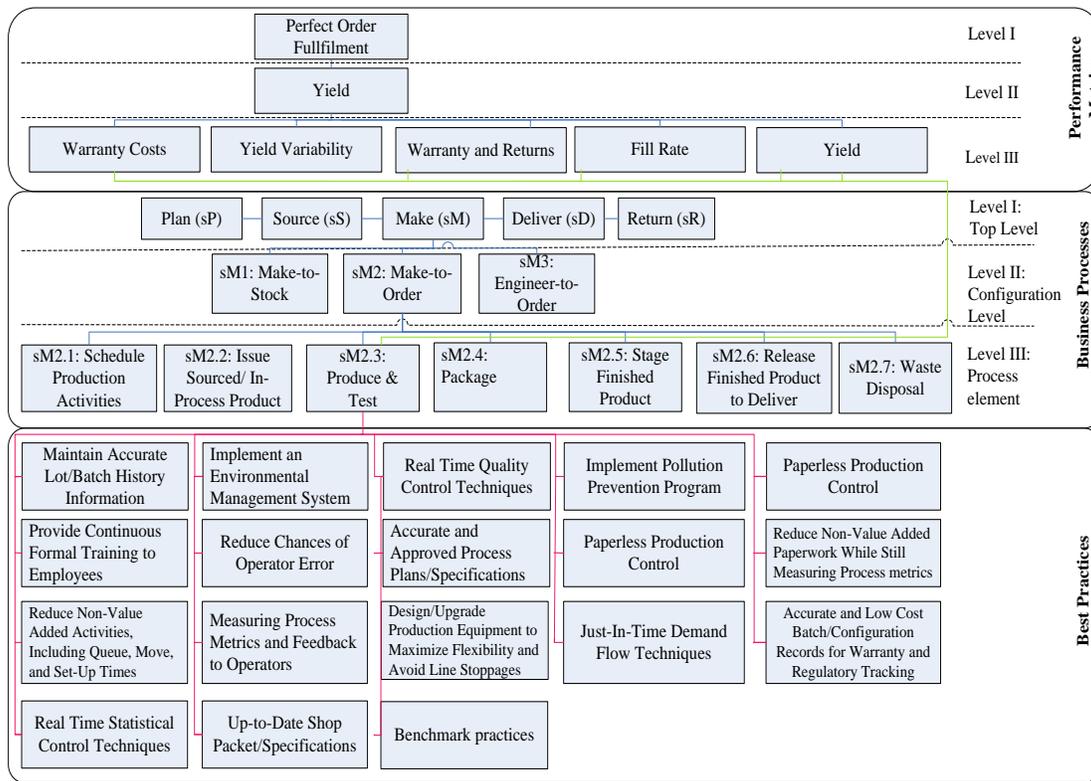


Figure 1. SCOR Model best Practice with Performance Measures and Process Element at Level 3 for sM2:3 Produce and Test [13]

3. Transferability of Best Practices to Developing Country Firms

Research activities have undergone by practitioners and academician on the major issues about best practices, its transferability and adaptability to suit to developing countries' scenarios [6, 8-14]. Technology transfer has been considered as a tool to bypass of growth for industrialization and advancement by developing countries [15]. The recent trends of global integration and collaboration are also encouraged experience sharing and benchmark against their practice and try to apply some them in their own organizations. However, such activities have been a challenge even for developed countries [6, 8, 16-18]. If the best practices' implementation is a challenge even to companies in developed countries, what could happen for firms struggling in unstable contexts such as those of developing countries?

The experience of developed and developing countries has shown the importance of adapting existing and already tested model to each particular organization and context [19-22]. This general lesson applies to less developed countries (LDCs) like Africa as well. Adaptation can potentially be used to reduce new research development time and costs. There are a lot of efforts are actually being attempted on adoption and implementation modern management techniques and philosophies in developing countries. They might potentially prove to be failures for different reasons, which may not be experienced in developed countries. Different practical researches and experiences have shown the models and practiced that demonstrated success in the developed world may fail in developing countries [8, 23-27].

Some of researchers have presented their findings so that their previous challenges and experiences can pave a way to start new research for further adaptation works. Walsham *et*

al., (1999) has studied a number of Geographical Information Systems (GISs) implementation activities that were being implemented in order to simplify the administration of the public sector activities in India. The implementation of GIS technology project assumed that the users were in need of map-based solutions. Cultural obstacles like absence of maps had never been seen as a problem constructed barriers for the implementation of the new technology. Thus, in their findings they have concluded that in order to have successful adaptation, structural changes, as well as changes in the actual training, are necessary [27]. The other interesting research by Kureshi (2010) was investigated & discussed the concept of supply chain integration for its great potential to improve the competitiveness of both large and small businesses in Pakistan. The Motorola Five-Stage Model of Customer/Supplier Partnership Development have benchmarked by large buyers in Pakistan's manufacturing industry to develop a more "culturally competent" model that could work in Pakistani business environment. During his research, he has found that the original model did not suit the existing situations of the Pakistan's firms. Finally, a modification of Motorola Five-Stage Model of Customer/Supplier Partnership Development was presented for benchmarking in manufacturing sectors of developing economies [25].

Most existing practices and researches still were mainly focus copying, adopting, or imitating best practices of widely publicized successes of companies. Unfortunately, imitating the existing best practice rarely works well because one size does not fit all. Such activities are not simple and results may not be always also successful. Research conducted by different authors verifies the same [8, 9, 14, 28]. Developing countries can learn from practices of developed countries companies. However, copying them by rote without analyzing the conditions within which they are developed and implemented. They should compare them to their own particular situation and making requisite adjustments would lead mistakes being made. The best practices should therefore be perceived more as models to be imitated than ready models to be copied by other companies. The best practice of one company will not automatically become the best practice in another unless it is adapted, successfully implemented and brings the expected results [8-9].

There some research initiatives and findings are tried to address such type adaptation research problem to different scenarios. The recent findings of Wassenhove *et al.*, [29] proposed operation research (OR) methodology to adapt supply chain best practices to humanitarian logistics. They have presented two cases of operation research applications to field vehicle fleet management in humanitarian operations. In other research done by Mohammed *et al.*, [30] presented key issues related to the selection of appropriate improvement initiatives for the organizations. They also proposed an initial model guidance model that is designed to assist organizations in selecting suitable improvement initiatives. The proposed model focuses on the steps to select a suitable initiative, which provides a structured process towards making a rational decision. Burrin *et al.*, [31] examined best practice adoption or adaptation with experiment how to make best practices adequate in an organization. In their findings, reusing these best practices requires their adaptation to the specific context of each organization. They have investigated the problem with case studies at the International Federation of Red Cross (IFRC) and Red Crescent Societies where it was necessary to adapt the Information Technology Infrastructure Library set of practices to the IFRC organizational cultures.

The above discussions are a few examples of the dangers of one sizes fit all strategies implemented in different context. The recent research by Massachusetts Institute of Technology (MIT) has also shown the same results even in developed countries context. One size doesn't fit all! The Supply Chain 2020 research project provides an excellent example of this type of approach to best practices. This means that the term 'best' may only apply when

the whole system of tailored practices is greater than the sum of the parts [9]. The objective of this research is to examine the existing best practices and challenges in a particular context of developing countries - specifically, in Ethiopia.

4. Research Methodology

It aims at describing and understanding the existing phenomena with contextual factors. There is no much research undertaken on the best practices in the developing countries. Therefore, our research fills this gap, by investigating the implementation and use of best practices in Ethiopia, *i.e.*, what types of best practices adopted and finally implemented, what the barriers and challenges faced developing countries. In order to cover a large number of Ethiopian companies and to ensure a comprehensive view, questionnaires and semi-structured interviews based survey were used for data collection. The respondents were chosen from the managing directors, manufacturing and/or production managers and executives, and also quality managers and executives. The items of best practices manufacturing implementation section were adapted from SCOR model (v.10) [13] and previous study [14].

5. Results and Analysis

This analysis is based the most frequent identifies best practices from SCOR model and other researches. The research question focus tried to answer the question: to what extent the best practices have been implemented in companies using the identified common SCOR model best practices and what are challenges have faced for using them.

5.1. Level of Best Practices Implementation

In order to further verify the extent of best practices implementation in Ethiopian manufacturing industries, the respondent companies were asked to rate the level of adoption on each of the best practices. The questions were set up on a four-point Likert scale to measure the extent of implementation described by each of the items. The scale was ranged from 1 to 4 where 1 = never implemented, 2 = poorly implemented, 3 = well implemented, and 4 = extensively implemented.

Table 2 illustrates the distribution of best practice mean scores. Most of the surveyed companies indicate that they use some of the best practices. The result has shown in table 1 below. Among all of the best practices, total quality management is found to be the leading best practice, with mean score 2.48. Other best practices that have been extensively implemented are benchmarking (2.39) and Available to Promise (2.35). However, the least practiced best practices are the electronic data interchange and bar coding/automatic identification practice. Those best practices which need an ICT infrastructure were lower than others.

When we have considered the number of firms and percentage ratings, the results have shown Outsourcing 14 (46.46%), TQM 11 (35.48%), Benchmarking 11 (35.48%), and Available 11 (35.48%) were in well implemented conditions. Whereas the VMI 18 (66.67%), EDI 17 (60.71%), Bar coding or Automatic identification 17 (65.38%) and CPFR 17 (54.84%) are never implemented in almost half of the surveyed firms,

The results from interviewed companies also stated the following are the major best practices implemented so far: Business Process Reengineering, ISO 9001:2008, Environmental Management System, Total Quality Management, Kaizen, Benchmarking, Balanced Scorecard, Food Quality & Safety Standard, & Outsourcing.

Table 2. The Implementation Level of Best Practices

Best Practices	1	2	3	4	Mean	S.D.
Total Quality Management	6(19.35%)	9(29.03%)	11(35.48%)	5(16.13%)	2.48	0.98
Benchmarking.	7(22.58%)	9(29.03%)	11(35.48%)	4(12.90%)	2.39	0.97
Available to Promise (ATP)	8(30.77%)	4(15.38%)	11(42.31%)	3(11.54%)	2.35	1.04
Carrier Agreements	8(27.59%)	8(27.59%)	9(31.03%)	4(13.79%)	2.31	1.02
Outsourcing	9(30.00%)	6(20.00%)	14(46.67%)	1(3.33%)	2.23	0.92
Supplier Performance Assessment System	12(38.71%)	9(29.03%)	7(22.58%)	3(9.68%)	2.03	1.00
Lean Production	10(33.33%)	11(36.67%)	8(26.67%)	1(3.70%)	2.00	0.86
Co-located Procurement	12(44.44%)	5(18.52%)	9(33.33%)	1(3.70%)	1.96	0.96
Cross-Docking	12(50.00%)	4(16.67%)	6(25.00%)	2(8.33%)	1.92	1.04
Postponement	12(42.86%)	9(32.14%)	5(17.86%)	2(7.14%)	1.89	0.94
Collaborative Planning, Forecasting and Replenishment (CPFR)	17(54.84%)	9(29.03%)	5(16.13)	0(0%)	1.61	0.75
Six Sigma	16(59.26%)	8(29.63%)	2(7.41%)	1(3.70%)	1.56	0.79
Vendor Managed Inventory (VMI)	18(66.67%)	4(14.81%)	4(14.81%)	1(3.70%)	1.56	0.87
Bar coding/automatic identification	17(65.38%)	5(19.23%)	3(11.54%)	1(3.85%)	1.54	0.84
Electronic Data Interchange (EDI)	17(60.71%)	7(25.00%)	4(14.29%)	0(0%)	1.54	0.73

Inventory management practices were also assessed. Table 3 shows the level of inventory management practices. The two frequent inventory management practices were company-wide coordination and management of inventory (2.59) and keeping a safety inventory as a consequence of sales variability (2.30). Just-in-time delivery inventory management practices show low levels of use. Inventory management practices used in the supply chain such as vendor managed inventory at production sites; joint inventory by suppliers and manufacturer show even lower levels of use. The results of last section have used similar to the VMI in firms level also.

Table 3. Inventory Management Best Practices

Inventory Management Practices	1	2	3	4	Mean	S.D.
Company-wide coordination and management of inventory	3(9.68%)	10(31.25%)	16(50.00%)	3(9.38%)	2.59	0.78
Keeping a safety inventory as a consequence of sales variability	8(26.67%)	8(26.67%)	11(36.67%)	3(10.00%)	2.30	0.97
Regional distribution centers for product distribution	8(28.57%)	8(28.57%)	9(32.14%)	3(10.71%)	2.25	0.99
Lowest inventory driven costs	14(45.16%)	5(16.13%)	4(12.90%)	8(25.81%)	2.21	0.86
Automated warehouse management	6(20.00%)	12(40.00%)	8(26.67%)	2(6.67%)	2.19	1.26
Just-in-time (JIT) delivery	8(29.63%)	10(37.04%)	9(33.33%)	0(0%)	2.04	0.79
Vendor managed inventory (VMI) at production sites	13(54.17%)	5(20.83%)	6(25.00%)	0(0%)	1.71	0.84
Joint inventory management by suppliers and manufacturer	14(53.85%)	10(38.46%)	2(7.69%)	0(0%)	1.54	0.63

5.2. Best Practices Implementation Barriers and Enablers

Implementing best practices in manufacturing system is not an easy task. For any change in organization to take hold and success, the challenges or barriers need to be identified and understood. The questions were set up on a four-point Likert scale to measure the extent of barriers and challenges described by each of the items. The scale was ranged from 1 to 4 where 1 = never challenge, 2 = few challenge, 3 = challenge, and 4 = strongly challenge. The best practices barriers are analyzed based on the status of best practices implementation by the respondent companies (Table 4), which are indicated from the previous section. The three main barriers in firms were the excising model best practices specificity to the developed countries operating environment, quality of skilled and lack of ICT infrastructure.

Challenges from interviewed firms also demonstrated similar results. The major challenges were: lack of expertise & professional experiences, the best practice ideas comes and changes without critical thinking about the use, management only involved in routine production operation, lacks commitment for the innovative ideas and technologies, lack of attention and awareness given for the best practice implementation, less attention for research & development activities, financial constraints for such intervention, low level of acceptance & high resistance for new ideas, lack of practical training & support form academic & research institutions, and lack of continuity & follow-up for introduced best practices.

Table 4. The Challenges of Best Practices Implementation

Type of challenges	Mean
The existing model specificity to the developed countries operating environment	2.97
Quality of skilled and cost effective workforce	2.94
Lack of information & communication technologies (ICT) infrastructure	2.93
Difficulty to implement the models & handle for practical operations	2.79
Non systematic approach to measuring customer requirements	2.78
Management practices and organizational working culture	2.77
Difficult to establish relationships based on shared risks & rewards	2.68
Lack of employee loyalty/motivation/ empowerment	2.57
Lack of physical infrastructure	2.45
A lack of willingness to share needed information	2.45

The next Table 5 is exemplified the use of information and communication technologies as enablers including both hardware and software in the firms. The questions were set up also on a four-point Likert scale to measure the level of enablers' status by each of the items. The scale was ranged from 1 to 4 where 1 = poor performance, 2 = fair performance, 3 = good performance, and 4 = excellent performance. The electronic e-mail service was dominant enablers available in the respondent companies. The use of new technologies and software such as forecast/demand management software; transport/warehouse software and e-procurement; and bar coding/automatic identification system are at poor performance level. Almost half of respondent companies were not having such type of enablers at all. However, most of companies were interested to adopt such types of enablers in the future. Some of the firms have already started program customization of software for local use.

Table 5. The Level Enablers for Best Practices Success

Enabler	Mean
Electronic mail system	2.8
Automated material handling system)	2.0
Enterprise Resource Planning systems	1.8
Advanced planning and scheduling software	1.7
Electronic data interchange (EDI) capability	1.7
Bar coding/automatic identification system	1.5
E-procurement system	1.5
Transportation/warehouse management	1.3
Forecast/demand-management software	1.2

6. Proposed Adaptation Model

Based on these findings, the firms need to follow a systematic approach for adapting the SCOR model best practices. In this regard, it is important to consider their existing scenarios, situation and priority. The SCOR best practices generally can be categorized into two categories as shown in Figure 2. Due to the existing challenges and lack of basic requirements as enablers to implement best practices in scenarios of developing countries, the firms must look for the best practices that suit their scenarios. Some of the best practices need a large

investment for implement as infrastructure than others. Others initiatives can be the best solutions for their current and priority problems like quality and productivity improvement activities. However, their adaptation initiatives are influenced by the challenges and current business practices.

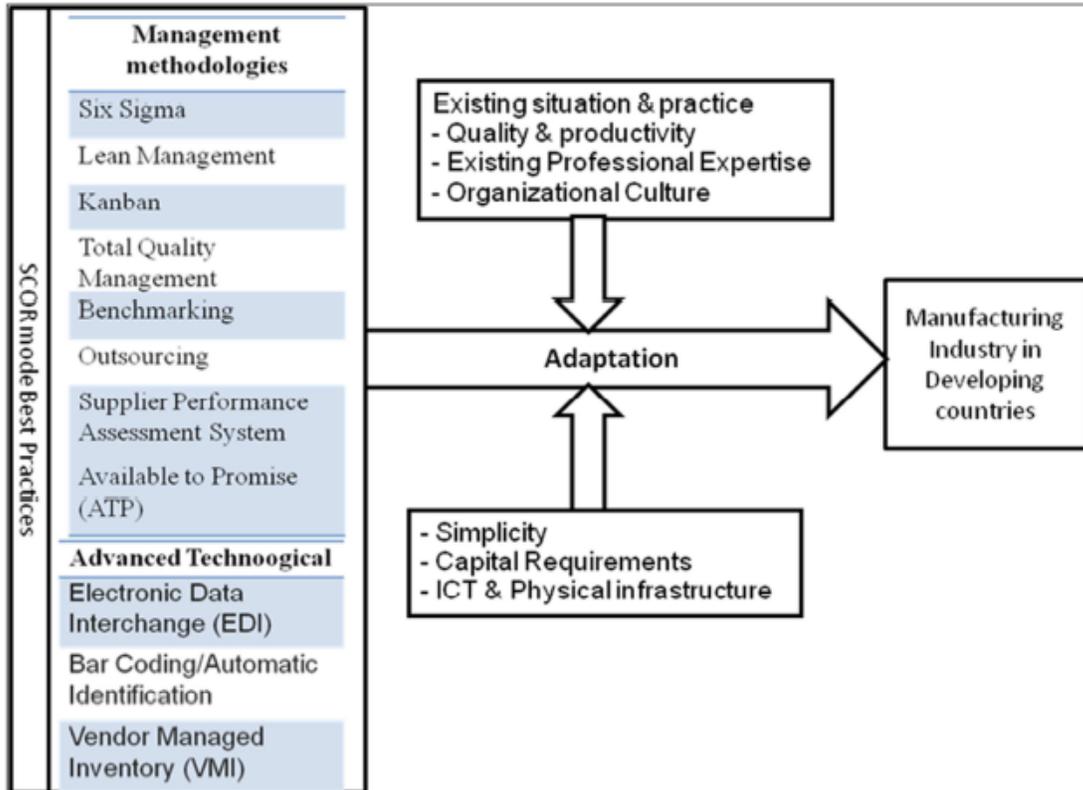


Figure 2. Best Practices Adaptation Consideration

An initial guidance model to adapt the best practices has proposed as shown in Figure 3. This proposed model focuses on four steps to select suitable best practices, which provides a structured process in making a rational decision. These proposed based on the researches of previous Mohammed, [32]; Fan, [33] models and research findings. These five closely linked stages are: searching and selection, adaptation, application and evaluation. The first stage in the adaptation processes is industrial analysis. In this stage, the results will reveal the organizational real situation and priority for improvement. It also leads to identify the existing enabling technologies. After this situational and contextual analysis, the second stage follows for searching and selecting the appropriate best practices that suit the existing situations and scenarios. This analysis leads to decision which best practices are suitable to adapt to the firms of developing countries. The first two stages relate to the analysis of the best practices content to be adapted while the last two stages relate the implementation and assessment of the results of the adapted contents.

In stage two and three adaptation processes, the analysis always subjected to the adaptation factors that influencing the adaptation processes. These are: (i) technical

and IT, *e.g.*, Outdated technology and lack integrated computerized systems; (ii) supply chain relationship, *e.g.*, reluctant to adopt partnership and alliance based relationship; (iii) national infrastructure, *e.g.*, inadequate ICT and physical infrastructure like road, rail and (iv) organizational and managerial, *e.g.*, obsolete functional based model and working culture difference [34]. This proposed adaptation model has unique highlights and recommend the need to understand a new scenarios and environment as well as providing an initial guide for the selection process. Finally after full implementation, it will be important to measure the improved performance or changes in the organizational performance as a whole. For this purpose SCOR model also contains performance measures and benchmarking tools for further improvement and look the gap. The feedback was also important after implementation for further improvement.

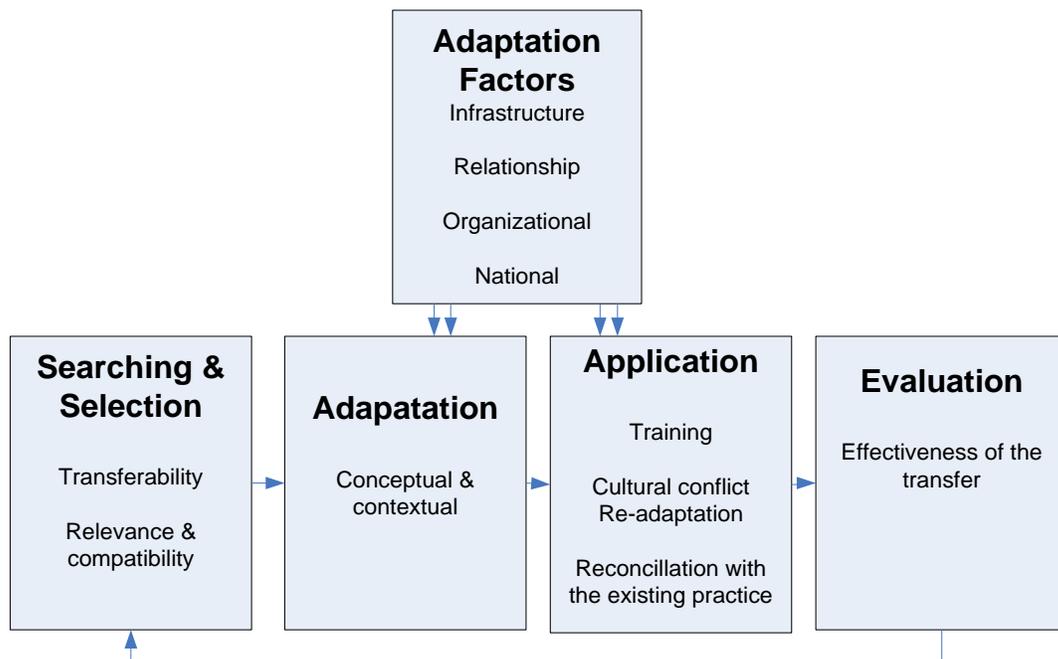


Figure 3. Recommended Best Practices Adaptation Steps

7. Conclusion

This paper aims to explore the extent of best practices implementation in Ethiopian manufacturing firms. The results show that most of the respondent firms have started to adopt best practices up to a certain extent. The firms should aware, understand the best practices and its purpose, because the main barriers of these firms are the lack of real understanding of best practices concept and employees' attitude. Some of the best practices facilitate more in the efforts of the developing countries towards supply chain integrations with their partners in developed countries and the overall improvements of supply chains. This finding has implication for the firms as it provide a mean to help them to search, select, adapt and apply best practices that suit the existing conditions and factors affecting process. The management should understand and emphasis the importance to overcome challenges for the successful implementation of best practices in their firms. The issue of the applicability of the best

practices to developing countries should be settled on the basis of the outcomes of such implementation. The search for best practices in developing countries were required an appropriate selection, adaptation, application and evaluation of the results above all else.

The major challenge in the future will be in addressing the environmental factors and conditions that challenges the implementation of the best practices to developing scenarios. This will require new kinds of adaptation mechanisms for best practices that suit the existing scenarios. The field survey and literature review provides the following key insights and lessons: (a) future best practices adaptation should be flexible enough to respond to dynamic manufacturing scenarios and markets; (b) best practices adaptation should favor approaches that provide a number of different technologies and management practices, which firms can search, select, adapt, implement, and evaluate so that they can fit; (c) helps to closing the gap between those practices observed in the field and those reported in the literature; and (d) some ICT based best practices adaption requires a conducive industrial environment and enhance linkages with supply chain members to enhance the returns to beneficial.

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