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The Effects of Agile Supply Chain Management Practices on Operational Performance (The Case of the Bishoftu Automotive Industry)

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Abstract

Bishoftu automotive industry (BAI) is the predominant manufacturing company in Ethiopia and is known for the manufacturing of multipurpose vehicles. The study sought to establish the effect of agile supply chain management practices on the operational performance of the Bishoftu automotive industry and examine challenges faced by the implementation of agile supply chain management practices in the Bishoftu automotive industry. Primary data were collected from 83 sampled respondents. The study employed a descriptive and explanatory research design. Descriptive and inferential statistics were employed to analyse the data. The finding reveals that all the agile supply chain management practices (CRM, strategic supplier partnership, customer sensitivity, and postponement practices) were explained and practiced in the industry. From the challenges faced by BAI, the inability to predict demand uncertainty of buyers and lack of management support to agile supply chain management practice challenges BAI to a great extent. All the agile supply chain practices were found to have a positive and significant correlation with the dependent variable which is the operational performance of BAI. Furthermore, the regression analysis shows that the construct of the model explained the independent variable (OP) by 54.6% and the independent variables of CRM and customer sensitivity had higher predicting power on the operational performance of BAI. The implication is that operational performance can be achieved and boosted through utilizing effective implementation of strategies of agile supply chain management practices.

Keywords: BAI, CRM, ASCM

Introduction

The world is in the era of supply chain competition, where organisation no longer acts in isolation as an independent entity, but as a supply chain to create value delivery systems that are more responsive to fast-changing markets, more consistent, and reliable (Christopher, 2005, Pandey & Gaug, 2009).

New managerial practices and unique business models emerge and fade constantly as managers strive to help their companies succeed in this less kind, and unpredictable world (Fawcett, Ellram and Ogden, 2007). The best word to describe the global market today is volatility. Organisations develop strategies to respond to ever-increasing levels of volatility in demand (Vinodh, Sundaraj & Devadasan, 2009). Basically, there are three different supply chain strategies. They are lean, agile and a combination of lean and agile (hybrid) supply chain strategies (Raturi & Evans, 2005). Supply chain agility has the ability to rapidly respond to changes in market and customer demands as the bearer of competitive advantage and a firm‘s performance Mensah, Diyuoh and Oppong, 2014. This is because supply chains are fundamentally intended to minimize system-wide costs while meeting required levels of customer satisfaction/service by balancing supply and demand across the value chain of the firm (Mensah, Diyuoh & Oppong, 2014). Schemer and Morgan (1998) and Clinton and Chen (1998) established that to be able to compete globally organisations must be able to re-orient their manufacturing processes and be able to measure their performance. According to Voss (1997) operational performance is an organisation‘s process parameter that is measurable. Operational performance

measures can be categorized as speed, market share, earning, quality, cost, customer satisfaction, and overall productivity (Graban, 2009).

The bundles of agile SCM practices have different effects on performance. Çemberc (2011) tested the awareness of performance while Shah and Ward (2003) tested the awareness of improvement in performance. Kisperska-Moron and Swiercze (2009), Hoek et al. (2001), and Christopher (2000) suggest that ASCM practices rely on market sensitivity, virtually, process integration, and network integration". However, a review of the literature suggests that there are other SCM and operational techniques that confer agility on supply chain firms. The implication is that ASCM practices rely on business processes and structures that facilitate speed, adaptation, and robustness (Azevedo et al., 2012). The business environment is growing increasingly challenging, and the demand for firms to improve their business operations to remain competitive is getting stronger. ASCM practices hold the potential to stand firms out the competition (Lori & Daniel, 2011), through adherence and application of customer sensitivity, strategic supplier partnership, supply chain virtualization, process integration, network integration, JIT, postponement, CRM, and knowledge leverage.

According to the Ethiopian investment commission report, In Ethiopia, there are 104 total automotive companies were licensed since 1998 for assembling and manufacturing. Among those 31 were foreign vehicle investment projects (largely Chinese projects) and 73 domestic vehicle assemblies. However, only few of these are operational. Bishoftu automotive industry is one of those licensed manufacturing automotive companies in Ethiopia. The automotive markets of the country heavily rely on importing besides limited capacity of production. Ethiopia is not really present yet on the global map of the automotive industry (MOTI & ECBP, 2008).

Statement of the Problem

The turbulent market conditions in the 21st century led to an increase in global competition and customer demands, with higher levels of turbulence, dynamism, and volatility. Businesses and political environments are increasingly subjected to unexpected shocks and discontinuities. As a result of these uncertainties, organisations today are faced with challenges in the supply chain which include the inability to meet up with changes in demand variability, service inefficiency, increasing inbound costs, ineptitude delivery, and longer customer lead times. Companies need to respond to ever-increasing levels of volatility in demand and focus their efforts on achieving greater agility (Njoroge, 2009; Inthar Marcus, 2010).

Recently, the companies focused on the word competition in an environment where global trade is increasing every passing day and the world becomes the only market. A supply chain resists the changes if it is agile in nature. Agility is all about creating that responsiveness and mastering the uncertainty (Christopher, 2000). Industries need to have a clear supply chain strategy and direction that support firms 'business strategy. In addition, the supply chain management including the production planning, inventory control, distribution, and logistics processes should be well integrated and coordinated to reduce costs and increase contribution margins (Heizer, 2011). Supply chain agility has been explored in the number of studies. It is defined with respect to the agile enterprise (Whitten et al., 2012), and the workforce capabilities (Yusuf et al., 2014).

Organisations are faced with challenges in implementing SCM strategies and the measures necessary to increase their agility (Ismail & Sharifi, 2006). Failure to adopt an agile supply chain strategy on SCM strategy has an impact on organisational performance and continuity.

In most Ethiopian manufacturing industries, including Bishoftu automotive, the supply chain strategies and activities were not clearly described and articulated. The supply chain decisions in this sector are mostly intended to gain short-term returns. In addition, the customer-focused and internally focused performance attributes of the supply chain system were not diagnosed and evaluated for improvement and benchmarking (Yikaalu, 2019).

Ad hoc and in efficient supply chain system to source, produce, and distribute has resulted in poor supply chain performance (reliability, responsiveness, flexibility, and asset management efficiency; Didia J.U.D., 2017).

The customer relationship management systems are subjected to inadequate planning and customer service practices of companies are not tactically coordinated.

Strategic supplier partnerships of the industry are also characterized by inefficiency and indorsed to several limitations including unreliable and potentially weak suppliers that have been selected due to the failures of knowledge leverages about the marketability and politicization environment. Last but not least marketability of the industry is highly manifested by make-to-stock other than customer sensitivity practices. As it was opined by Daniel (2015) indicates that Ethiopia's supply chain is characterized by poor supply chain strategic practices. Juneho Um et al. (2016), opined that agile supply chain

management practice affects the business performance of manufacturing firms. Furthermore, as it was recommended by Ateke, Brown Walter and Didia J.U.D. (2017), firms should gravely enhance supply chain agility efficiency in the way they source for and deliver customer services. Even though the supply chain practice is well considered in the business strategy of BAI, the performance is not quantified and described (BAI – Business Plan, 2013–2015 GC).

Literature Review

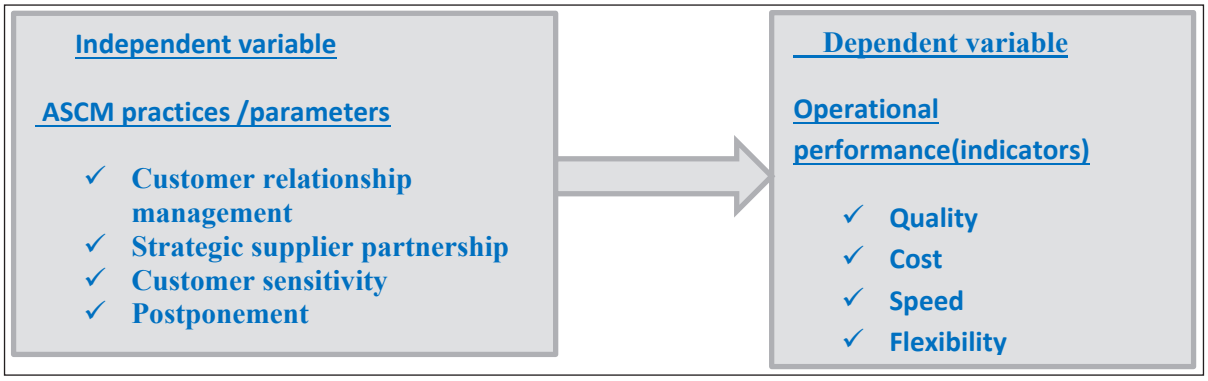
Wang et al. (2004) classified supply chains under three groups: lean supply chain (LSC), agile supply chain, and hybrid supply chain (HSC). There are six groups in total when reverse supply chain, green supply chain, and global supply chain. The concept of agility was given by Goldman et al. (1995). It means "readiness to change", from a business perspective, agility is defined as a strategy that is more responsive in a volatile marketplace, where this strategy is totally demand driven. Kasarda and Rondinelli (1998) observe that agility has received the most consideration in manufacturing where it is viewed as an emergent competitive weapon.

Brusset (2016) opined that agility is a requirement for world-class manufacturing performance while to Sharifi and Zhang (2001); agility is just a new paradigm in manufacturing. There are three basic characters tics of supply chain agile operation (Dubey et al., 2018).

Agile supply chain is not the option available but a necessity for the success of the company. Agile supply chain is the solution to the many problems that exist in today's supply chain management networks. This concept has been recognized, as a solution to increase the responsiveness of a supply chain in changing environment.

Today's supply chains compete on various strategies, but the most widely used one is the lean and agile strategy. This solution has facilitated the suppliers to manage their own data through self-service functionality (Ambe, 2009; Kisperska-Moron & Swiercze, 2009; Hoek et al., 2001; Christopher, 2000).

Dubey et al. (2018) observe that SCM agility recognized emergent competitive strategy.



Conceptual framework of the study, adapted and modified by author, 2020.

Fig. 1: Conceptual Framework of the Study

Description of the Study Area

The geographical location of the study area rests 45 km east of Adis Abeba (capital City of Ethiopia) in the town of Bishoftu (Former Debrezeit). Bishoftu automotive industry passes through several changes and named BAI after much more manufacturing transitions from repair and maintenance department to fully assembling units. Currently, BAI assembles public transportation Buses, heavy-duty trucks, pickups, small vehicles and multipurpose military vehicles. Its annual turnover has reached 2.2 billion birrs, with a production capacity of manufacturing 16 pickups, and 10 trucks.

Research Population and Sample

The researcher targeted 322 employees of the company due to their proximity to the study area and conceptual status with logistics and supply chain management. The sample respondent was selected based on disproportionate stratified random sampling techniques under this stratum the employees who work and leads the company from the logistics and supply chain management-related activities were selected. The study comprises Bishoftu automotive manufacturing company staffs strata includes management officials, production/operation officers, Warehouse and stores department, logistics, purchasing

department, customer service department, marketing and sales, inventory control section department, and quality assurance and control section. Sample respondents were selected by using stratified sampling techniques and using the Cochran formula of sample size determination (95% confidence level and 5% confidence interval). The sample sizes were 102 respondents.

Table 1

Targeted Department		Target Popn.	Sample
Valid	Management	9	5
	Production/operation	119	25
	Customer service	21	9
	Quality assurance and control	33	10
	Logistics	21	10
	Purchasing	29	11
	Warehouse and store	24	9
	Inventory	27	10
	Marketing/sales	39	13
	Total	322	102

Source: BAI HR, and own computation based on Cochran's formula.

Instrument and Measurement

Five sections of lead items (constructs of the study – CRM, SSP, CS and postponement) and OP which contains a total of 32 item questionaries' were distributed to selected respondents of 102. The questionaries' are organized based on a five-point Lickert scale that ranges from 1 strongly disagree to 5 strongly agree. Out of 102 distributed questionaries' only 83 questionaries (81% of response rate were complete and fully collected. SPSS v. 23 was used as an instrument for analysing the collected data.

Table 2: Reliability Test

	Constructs	Cronbach α	No. of Item
1	CRM	0.749	8
2	CS	0.876	6
3	SSP	0.795	6
4	PP	0.790	6
5	OP	0.896	5
	Overall	0.8212	31

Table 3: Aggregate Mean Value and Standard Deviation of Constructs

Constructs	N	Agg. Mean	Standard deviation
CR	83	3.72	1.04
SSP	83	3.35	1.283
CS	83	3.63	0.451
PP	83	3.21	1.021
OP	83	3.35	0.891
Valid N	83		

Results and Interpretations

The results of the study are presented based on the analysis of five variables attributed to agile supply chain management practices effect on the operational performance of BAI. Based on the result of the analysis, postponement (M = 3.21, SD = 1.021) has the lowest aggregated mean value, which indicates that the postponement function is not practised well in the industry. Following the postponement, strategic supplier partnership (M = 3.35, SSD = 1.283) has the next low mean value which implies again that things that express strategic supplier partnership are not considered well in the industry. Customer sensitivity on other hand has a better mean value (M = 3.63, SD = .451), but it still not satisfactory enough to conclude that it is good compared to best practices. Again, the customer relationship management practice has a mean value of (M = 3.72, SD = 1.014) is outstanding, this implies that the industry is good at practicing customer relationship management practice.

The operational overall performance as measured with quality performance, speed flexibility and on time delivery has an aggregated mean value of 3.35, which still indicates the gap that, there are areas that need much improvement to achieve Excellence. With regard to the challenges of implementing agile SCM practice, difficulty to forecast appropriate demand of buyers (M = 4.20, SD = 0.728) and lack of management support on agile supply chain management (M = 4.16, SD = 0.552) are the major challenges BAI.

Table 4: Variance Explanation

Model	R	R^2	Adjusted R^2	St. Error
1	0.750	.543	0.546	0.748

As illustrated in the table, CRM, SSP, CS, postponement, and operational performance have a value of.750 indicates a strong correlation between operational performance and the four independent variables which shows a good level of prediction. the R^2 value (also called the coefficient of determination), which is the proportion of variance in the dependent variable that can be explained by the independent variables, 56.3% change in operational performance of the Bishoftu automotive industry is attributable to the constructs. Adjusted R^2 value of 0.546 indicates that 54.6% of the variation in the operational performance of BAI can be explained by the model.

Table 5: ANOVA (Model Fit Test)

Model	Sum of Squares	DF	Mean Square	F	Sig
Regression	4.829	5	1.207	12.82	0.000b
Residual	7.693	78	0.099		
Total	12.522	83			

DV: op, Source: SPSS output survey, 2020.

As shown in the table, model fitness was checked for the data and found to be fit (F = 12.82, p = 0.000), which is eligible for regression analysis.

Table 6: Predictors and Their Coefficients

Model	Unstandardized Coefficients		Standerdized Coefficient's	T	Sig
	B	St. Error	Beta		
Constant	1.85	0.332		5.435	0.000
CRM	0.002	0.008	0.785	0.274	0.000
SSP	0.017	0.028	0.055	0.609	5.44
CS	0.527	0.079	0.608	6.653	0.000
Pp	0.005	0.044	–0.010	–0.05	0.917

As portrayed in the table, two variables namely CRM and customer sensitivity with a value of Beta = 0.785, p = 000, and $\beta = 0.608$, p = 000 are statistically significant and positive relationship with operational performance. While the remaining two variables namely strategic supplier partnership and postponement has insignificant and have a weak relationship with the operational performance of BAI. When referring to the unstandardized coefficients the mode for BAI can be stated as Y (op) = 1.85+ 0.002CRM(X1) + 0.527CS(X 3) + ε.

Discussion

The study sought to establish the effect of agile supply chain management practice on the organisational performance of BAI. Upon considering the five specific objectives of the study with the theme of evaluating the effect of agile supply chain management practices on the operational performance of the Bishoftu automotive industry, the study established that:

- The first objective of the research is to analyse the effects of customer relationship management on the organisational operational performance of BAI. Based on the descriptive analysis, mean score of customer relationship management is greater than 3.5 this means that the respondents agree with the statements of customer relationship management and the practice has been proficient. The correlation analysis result from the study shows that there is a positive and significantly strong relationship between customer relationship management and operational performance of BAI, with a correlation coefficient of 0.72 with a significance value less than 0.01. In addition, the regression analysis shows that customer relationship management is statistically significant predictor of organisation operational performance with a beta coefficient of 0.785 at a significance level of 0.000.
- The second objective is to examine the effects of strategic supplier partnership on the operational performance of BAI. According to the descriptive analysis mean score of strategic supplier partnership is greater than 3.35, which implies the respondents agreed to the fact that strategic supplier partnership practised in the industry but, the analysis shows that some improvement would be required to the best of it. Considering the correlation analysis spearman rho correlation was deployed the result from the study shows that there is a positive and a weak correlation between strategic supplier partnership and operational performance, with a correlation coefficient of 0.063 with a significance value greater than 0.01. The regression analysis indicates that strategic supplier partnership is a statistically insignificant predictor of organisational performance of BAI with a beta coefficient of 0.017 at a significance level of 0.544.
- The third objective is to study the effects of customer sensitivity on the operational performance of BAI.

From the descriptive analysis, it can be concluded that their mean score is greater than 3.5 meaning that the respondents agree with the statements of customer sensitivity. Under correlation analysis, the result from the study shows that there is a positive and significantly strong relationship between customer sensitivity and organisational performance, with a correlation coefficient of 0.610 with a significance value of less than 0.01 and it is statistically significant predictor of organisational performance with a beta coefficient of 0.527 at a significance level of 0.0.000 because of its p-value is 0.000.

- The fourth research objective of the study was to investigate the effects of postponement on the organisational operational performance of BAI. From descriptive analysis, it can be concluded that their mean score is less than 3.5 meaning that the respondents agree with the statements of postponement, but the practice held the lowest of its importance. Under correlation analysis, the result from the study shows that there is a positive and a weak correlation between postponement and operation performance, with a correlation coefficient of 0.094 with a significance value greater than 0.01. The output from regression analysis shows that it is insignificant predictors of the dependent variable which is an operational performance with a beta coefficient of –0.005 at a significance level of 0.917.
- The fifth objective of the study is to assess the challenges that affect the implementations of agile supply chain management. Based on the descriptive analysis difficult to forecast the appropriate demand of buyers and the lack of management support on agile supply chain management practice are the major challenges of agile supply chain management in BAI because their mean score is above 3.5.

As indicated from the output of regression analysis only two agile supply chain management practices are the relevant effect on the operational performance of BAI. A regression coefficient result shows that two out of the four variables are statistically significant in predicting the organisational operational performance of BAI. The statistically significant variables are customer relationship management and customer sensitivity, as evidenced by their P-values ($P < 0.001$)

Conclusion and Recommendation

From the descriptive statistical analysis result regarding the state of agile supply chain management practice in BAI the study concluded the following:

- All the agile supply chain management practices including in the model (CRM, SSP, customer sensitivity, and postponement practices) are practiced in the industry.
- In addition, the study concluded that agile supply chain management practices contributed to BAI organisational performance to a great extent.
- With regard to challenges of agile supply chain management practice implementation on BAI, demand uncertainty of buyers and the lack of management support to agile supply chain management practice are major challenges.

In relation to the relationship (correlation analysis) between agile supply chain management practices and operational performance, the study concluded that:

There is a positive and significant relationship between agile supply chain management practices (Customer relationship management, Strategic supplier partnership, Customer/market sensitivity and postponement) and the organisational operational performance of BAI. Furthermore, agile supply chain management practices namely strategic supplier partnership and postponement practices have a weak relationship with the organisational operational performance of BAI, while CRM and customer sensitivity practice has a strong and significant relationship with the organisational operational performance of BAI. In relation to the predicting power of independent variables, the study concluded that the independent variables of customer relationship management and customer sensitivity, practices had significant predicting power on the operational performance of BAI. Strategic supplier partnership and postponement practices did not have predicting power on the organisational performance of BAI.

Recommendations

Based on the above findings, the study therefore recommends the following. The findings of the study established that BAI adopted logistics and supply chain

management practices regularly including agile supply chain management practices and strategies. Moreover, the study confirmed that logistics and SCM management practices had a strong positive relationship with the operational performance of BAI. Therefore, the study recommends Bishoftu automotive industry:

- To work closely in collaboration with strategic supplier partnership practices and it might be useful to advance the extent of supplier selection for reliability and potential.
- The company strives to keep each other informed with customers and suppliers about events or changes that may affect the relationship and aspect of business improvement.
- The company also shall be ready to respond the immediate and unexpected customer order quickly and frequently to enhance profitability and improve the marketability issue.
- The company also needs to maintain continuous mutual improvement programs with suppliers.
- Working on minimizing the response time, carrying costs, the rate of return and efficiently utilizes its resources including time, employees, space and machines.
- The company (BAI) has to dedicate to improve postponement practice to obtain the best output from the solicitation.
- Further, the study established that the key agile supply chain management challenges faced by BAI demand uncertainty of buyers and the lack of management support. Therefore, the study recommends that recommends BAI.
- To form a quantitative forecasting based on point of sale data- and demand-driven methods to improve the existing rule of thumb forecasting techniques (forecasting techniques based on previous sales and production data).
- Assuming some uncertainties of change and being ready for responding quickly as the market becomes sensitive, reacting quickly to the market when it needs a reaction.
- Maintaining knowledge leverage, forming an agile supply chain management team, providing training to employees about the concept and practice of agile supply chain management, and collecting feedback.

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