
CAUSAL LINKAGE AMONG BUSINESS ANALYTICS, SUPPLY CHAIN PERFORMANCE, FIRM PERFORMANCE AND COMPETITIVE ADVANTAGE

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ABSTRACT

The research work examines the causal linkage among business analytics, supply chain performance, firm performance and competitive advantage. The conceptual model and hypothesis was developed through literature review and collected data from industries were empirically tested using structural equation modeling technique. The finding suggest that companies that support their analytical capabilities with good information system are likely to be more capable of performing better and better understanding of the factors of business analytics that influences the organizational competitive advantage

Key words: *Business Analytics, Supply Chain Performance, Firm Performance Competitive Advantage*

INTRODUCTION

Supply chain managements play an important role in this modern world since the competition is no longer between the organizations but between the supply chains(Narasimhan & Jayaram, 1998; Trkman, McCormack, De Oliveira, & Ladeira, 2010). The supply chain(SC)

achieves its competitive advantage by increasing the efficiency of SC analytics and the techniques for the optimization has been an integral part of the organizational business process.(Wang, Gunasekaran, Ngai, & Papadopoulos, 2016). Over the years, interest in research of Business Analytics (BA) has been increasing since

it provides the correct decision in business based on the amount of data.

Here based on the Supply-Chain Operation Reference (SCOR)-Plan, source, make, and deliver. We consider analysis of BA on different parts of the Supply Chain (Trkman et al., 2010). This paper thus analyses the causal linkage among business analytics, supply chain performance, firm performance and competitive advantage. This is important in achieving competitive advantage by enhancing the effectiveness and efficiency of supply chain analytics. The optimizing technique and business analytics playing an important role in organizational business processes by using business analytics. We can take important and crucial business decisions based on bundles of very large volumes of both internal and external data (Rao & Holt, 2005).

Structural equation modeling (SEM) refers to a diverse set of mathematical models, computer algorithms, and statistical methods that fit networks of constructs to data (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). The methods of SEM help researchers to incorporate unobservable variables measured indirectly by the indicator variables (Vinzi, Chin, Henseler, & Wang, 2010). It includes confirmatory factor analysis and path analysis (Ganeshkumar & Nambirajan, 2013). For this paper, we used partial least squares path analysis to check the hypothetical model. While examining the model. The structured of paper is as follows: Initially

the relationship of supply chain performance, firm performance, and competitive advantage are considered along with a conceptual model and hypothesis. Secondly, we consider the methodology that is being used in this research work. Next, the results and discussion are explained. The conclusion reflects the main implication of research and scope for future study.

LITERATURE REVIEW AND CONCEPTUAL MODEL

Supply chain and the mathematical equations cannot effectively capture the dynamics that occur within these value systems. Improving and monitoring the performance of a supply chain has become an increasingly complex task and includes many management processes such as identifying measures, defining targets, planning, communication, monitoring feedback (Handfield & Bechtel, 2004). Business analytics analysis the bundles of very large volumes of data. Large companies may have thousands of different suppliers, the use of such frameworks is impossible without business analytics (Limam Mansar & Reijers, 2007). Business analytics improves supply chain performance through analytical measurement system. it promotes the efficiency within an organization, improved business analytics capabilities reduces the costs and achieves higher profit margins. Many organization that already have system in place to collect data and gather information often find themselves in a

situation where they do not have a suitable approach to put their vast data and information into use for strategic decision making. It is also critical that the organization constantly evaluate its models to ensure their predictive validity (K. McCormack et al., 2009). The supply chain management is quite a broad term and encompasses the integration of organizational units and business processes

along a supply chain to coordinate materials, information and financial flows in order to fulfill customer demands (K. P. McCormack & Johnson, 2016). Since SCOR (Plan, source, make, deliver) has been widely employed for supply chain optimization it was used as a framework for our study (Lockamy III & McCormack, 2004)..

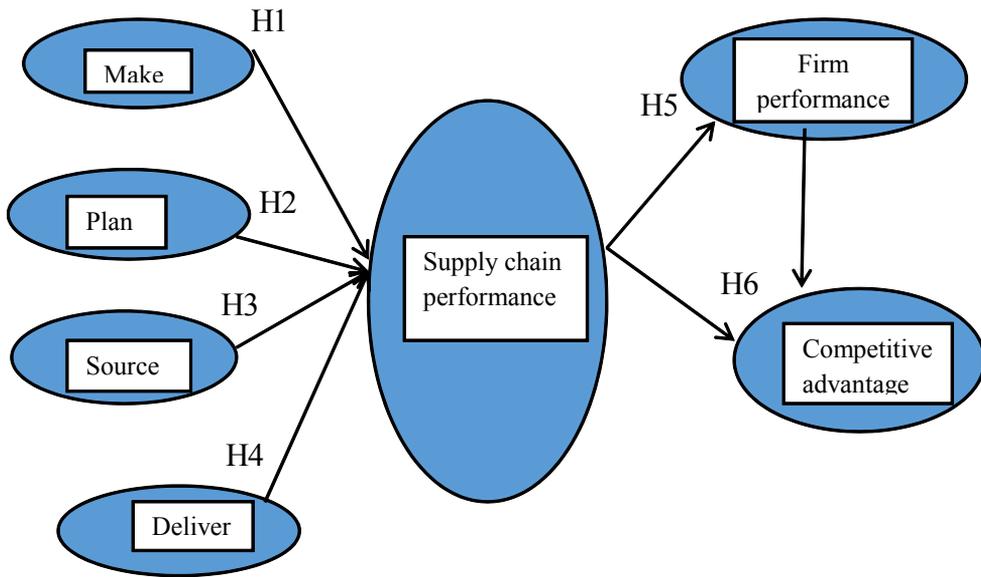


Fig 1: Conceptual Model

H1: There is a positive relationship between make and supply chain performance, H2: There is a positive relationship between plan and supply chain performance, H3: There is a positive relationship between source and supply chain performance, H4: There is a positive relationship between deliver and supply chain performance, H5: there is a positive relationship between supply chain performance and firm performance, H6: there is a positive relationship between supply chain performance and Competitive advantage and H7: there is a positive relationship between firm performance and Competitive advantage.

3. RESEARCH METHODOLOGY

This study investigates the casual linkage since it aims to study the impact of analytics in organizational performance and competitive advantage. The survey embraced questions regarding the key practices in supply chain and its applications in the supply chain. The deliberations and interviews were based on the SCOR (plan, source, make, deliver model). All the construct is related to the perceived performance as determined by the survey performance, as determined by the survey respondents. It is represented as a single item for each decision area. The participants are asked to give their suggestions in five point Likert scale (1=Strongly disagree; 5 Strongly agree).

The sample includes 31 companies from different industries and the respondent came from different positions (sales, IS, planning and scheduling, marketing, manufacturing, engineering, finance,

distribution, and purchasing (Ganeshkumar & Nambirajan, 2013) .

RESULTS AND DISCUSSION

To test the hypothetical model and evaluate the influence of BA variables on supply chain performance, firm performance and competitive advantage using, structural equation modeling has been used (partial least square; PLS) was used to test the hypothesis. The construct of analytics capabilities in the plan , source, make and delivery areas of SCOR area were considered as latent variables of the reflective construct related with performance, the research results show that the use of BA in critical process area can affect supply chain performance , firm performance and competitive advantage. The different sample of companies from different industries inculcate the findings. Our result provides a preliminary indication that an investment in BA brings most significant improvement.

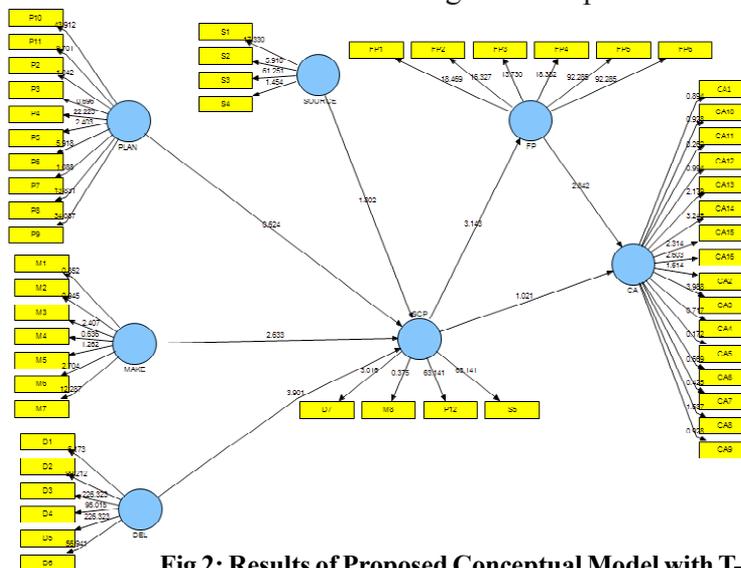


Fig 2: Results of Proposed Conceptual Model with T-Statistics Values

When it comes to making process, the T stat value is 2.633 which have a positive influence on supply chain performance, the companies are adopting constraint-based planning methodologies which include customer planning and scheduling information and they can improve upon the lead time information updates also. Deliver components have greater impact on supply chain performances. The T stat value of deliver component is 3.901 which

influence the supply chain performances. The supply chain performance has a T stat value of 3.143 on firm performance, which shows that supply chain performance has a greater impact on firm performance which enhances the competitive advantage. The price, quality, delivery dependability, product/service innovation, time to market incorporates the competitive advantages. Fig 3 represents the Beta value of the components

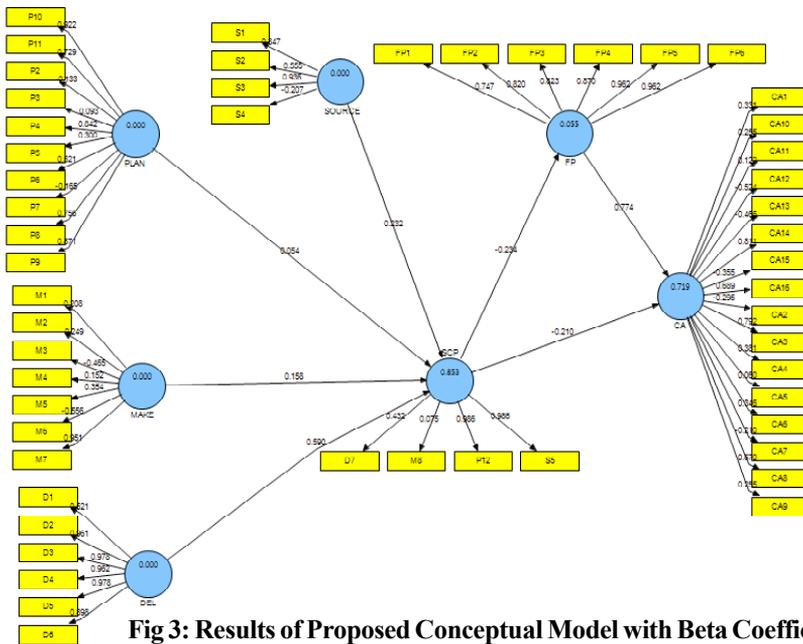


Fig 3: Results of Proposed Conceptual Model with Beta Coefficient Value

Table 1: Result of Hypothesis-testing

RELATIONSHIPS	Beta Value	S.E	T stat Value	Hypotheses Results
H1:Make to Supply chain Performance	0.158	0.06	2.633	Accept at 0.01 significant level
H2:Plan to Supply chain Performance	0.05	0.09	0.624	Reject
H3:Source to Supply chain Performance	0.232	0.13	1.802	Accept at 0.10 significant level

H4:Deliver to Supply chain Performance	0.590	0.16	3.901	Accept at 0.01 significant level
H5:Supply chain Performance to Firm Performance	-0.234	0.08	3.143	Accept at 0.01 significant level
H6:Supply Chain Performance to Competitive Advantage	-0.210	0.21	1.021	Reject
H7:Firm Performance to Competitive Advantage	0.77	0.22	3.41	Accept at 0.01 significant level

Fig 2. shows that the T stat value of plan component is 0.624. It had value less than 1.96 which implies that the planning component has less impact on supply chain performance. Many companies are not using analysis tools to examine the impact before a decision-making, but if they use them, then the companies can have better planning. The forecast accuracy value is 0.701. Even the usage of mathematical methods for forecasting the demand is also less. These all factors affect the supply chain performance in a broader way.

Studies reveals that the usage of analysis tools to examine the decision-making, the usage of mathematical model for forecasting demand and good strategies influences the planning processes. So companies can improve their planning process by concentrating on these aspects thereby by it can improve the supply chain processes.

Further gathering of enough data may be difficult and time consuming. It is noted that a company is unable to make simultaneous efforts in each of the four SCOR areas (Plan, source, make, deliver).

CONCLUSION AND IMPLICATIONS

The analytical capabilities have greater impact in guiding towards precise decisions and impart automated decisions in some tasks in organizations. The companies that support their analytical capabilities with good information system are likely to be more capable of performing better. The result provide limited support for the impact of analytics in the deliver area, it is because delivery is often outsourced and decision take place at the end of the decision process where their effect may be limited but after reaching a certain level in plan, source and make areas, Business analytics has greater impact on performance in deliver area. Business analytics can bring a larger improvement in performance, the investment in business analytics plays a greater impact in organization performance; further gathering of enough data may be difficult and time consuming. It is noted that a company is unable to make simultaneous efforts in each of the four SCOR area (Plan, source, make, deliver). But the proper investing sequencing depends on the characteristics of the supply chain, and firm performance

as treated as a single construct in this paper .It also investigates how Business Analytics in various areas of supply chain impact different performance metrics such as on-time delivery quality, costs, reliability, and flexibility.

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