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Research Article

# The Adoption of e-SCM Adoption in Improving the Performance of the Firm

Dinesh Kumar Pandey

Research Scholar, Shri Mata Vaishno Devi University, J&K, India; Assistant Professor, R. R. Institute of Modern Technology, Uttar Pradesh, India

Sunil Giri

Associate Professor, Management Development Institute Murshidabad, West Bengal, India

Saurabh Srivastava

Associate Professor, Shri Mata Vaishno Devi University, J&K, India

Rooplal Sharma

Assistant Professor, Shri Mata Vaishno Devi University, J&K, India

**Abstract**

Information flow is the essential component of supply chain of the firm. The sharing of information and its accessibility motivates the firms to incubate the technologies that facilitate its customers. The main challenge of the firms is to adapt to the dynamic requirement to deliver its produce quickly to the customers, according to their expectations. The issues of synchronization of supply and demand may be resolved by involving e-SCM. The strategies to involve the technology managed by the use of internet and information about supplies, orders of customers, products/services and other business functions of supply chain management can improve upon the performance of the firm. However the issues in successful adoption of the e-SCM in the organization are based on multiple factors. The paper based on the empirical analysis explores the factors that are important in adopting the e-SCM. It further establishes that the performance of firms relies on the organizational factors that have impact on the usage of information system by emerging technology.

**Keywords** -e-SCM, Information system, SMEs, Common Bias Method, IT infrastructure;

## Introduction

In the ongoing era of information sharing and accessibility, the firms strive to fulfill customer's needs. The utility of information and technologies is important for prompt delivery of goods and services. The expectations of customers

vary rapidly, and the firms need to deliver the ordered products as fast as possible. The major challenges for a firm particularly engaged in the delivery of the essential consumer services and product is about catering to the dynamic requirement of the customer as well as sustaining the growth and performance (Wang and Lo, 2013). The speedy delivery has become a competitive differentiation to many firms, mainly online retailers (Gupta and Ramachandran, 2021). To manage this, the firm's supply chain requires speed and flexibility in order to synchronize the supply with demand with the help of connected technologies. The supply chain based on information system and connected technologies also known as electronic supply chain (e-SCM) can be defined as integration of key business processes from end-users through original suppliers that provide products, services and information to add value for customers and other stakeholders through internet (Gimenez and Lourenco, 2008, Abdirad, Krishnan,2020). It explains that e-SCM mainly provided the support by the internet usage to invest in the practice of SCM right from procuring materials, automated product, all inventory management, and order entry with its management, distribution and delivery to the clients. Hence, e-SCM gives facility to view the whole process as a single system and so reduces the cost and improves customer value.

Information flows are always the specific component of supply chain management (Quinn, 1997; Lummus and Vokkurka, 1999, Abdirad, Krishnan, 2020) where e-SCM is seen as an impact which helps the firms to handle the challenges thatarise in global markets; however, the rate of e-SCM adoption is very less among the firms. Although, e-SCM adoption for supply chain activities decrease cost, increase productivity, improve forecasting, make possible centralized planning, enhance responsiveness, (Serve et. al., 2002) the firms face many challenges to adopt e-SCM for supply chain activities. The challenges faced by large enterprises (LEs) and small-medium enterprises (SMEs) are different since the features of both SMEs and LEs are different. SMEs have inadequate accessibility to resources like money, time and skills (Laukannen et. al., 2007) and on the other hand LEs are less flexible to adopt new innovations (Levy and Powell, 1998). To adopt technology, challenge is experienced more by the SMEs compared to LEs (Arend and Wisner, 2005). One of the reasons could be the perceived costs which ultimately led to the ineffective adoption of tools and techniques in SCM (Quayle, 2003). The research in this area is concentrated on SMEs' as well as LEs (Vaaland and Heade, 2007; Liu et. al., 2010; Basua et. al., 2011; & Frank et. al., 2013). However, the issues related to the SMEs are based on their dependence on the LEs, either being their supplier or the competitor. They have their own challenges of adapting to the dynamic requirement of the clients. The adoption of new practices and technologies for SMEs is related with their organizational as well as environmental factors. In view of the requirement for adopting the e-SCM to improve the visibility of their operations and supply chain, the firms need to be aware of the factors and that can enable the adoption for improving the performance. The paper focuses upon the two specific research questions asRQ1: What are the factors that influence the adoption of e-SCM by firms, specifically SMEs? RQ2: Does the adoption of e-SCM influence the firm's performance, specifically SMEs?

The study has taken the context of developing nations and it has been carried out in the state of Uttar Pradesh in India. The rationale behind taking the Indian context can be explained with the fact that government in India focuses on promoting SMEs' to adopt technology as SMEs help to boost up the economy. Over 13 million MSME units in India contribute to 8-9% share in GDP.

**Theoretical Background**

Dynamic capabilities theory was brought into the academic literature by (Teece and Pisano, 1994) to explain the dynamic market environments, creating more economic value than competitors and competitive advantage. As per Wang and Ahmad (2007) dynamic capabilities are "a firm's behavioral direction to continuously integrate, reconfigure, replenish and rebuild its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response towards the changing environment to attain and sustain competitive advantage". The firms need to develop the capabilities to be fast and flexible while doing business in the dynamic changing market environments to achieve competitive advantage (Teece and Pisano, 1994).Firms need to adopt the latest technologies like e-SCM to recreate its capabilities and to attain novel form of competitive advantage. It has been established that the adoption of e-SCM by firms for supply chain activities reduce cost, increase productivity, improve forecasting, enable centralized planning, increase responsiveness (Serve et. al., 2002).

The adoption of the technology at firm level in the literature is found to be innovation diffusion (DOI) (Rogers, 1995) along with Technology-Organization-Environment (TOE) structure (Tornatzky and Fleischer, 1990). Rogers, (1995) proposed a theory DOI as the process of interaction between the members of a social system and the innovation, which is communicated through channels. Moreover technology adoption decisions by the firms is always influenced by the complexity, compatibility and the relative advantage promised by the innovation, the time taken by the communication channels and the behavior of the members in the social system. Later, in 1990, (Tornatzky and Fleischer) proposed the framework of TOE. According to this framework technology adoption decisions in the firms were influenced by technological context like perceived costs, perceived benefits. Environmental situation includes competitive pressure, Government support. DOI theory fits into the TOE framework i.e.; it was not found to be inconsistent (Zhu et. al., 2006a; Lacovou et. al., 1995). Such as, leader characteristics proposed into DOI theory were studied as top management support in organizational circumstance onto TOE framework; the organization external characteristics can be referred to the environmental situation of TOE structure (Zhu et. al., 2003; Kurnia et. al., 2015).TOE was found as a relevant framework to test the adoption of e-SCM by both SMEs and LEs in developing countries like India (Lin. H.F, 2014; Kurnia et. al.2015; Tarafdar and Vaidya, 2006).

Transaction cost theory posits that the transactional costs of managing interactions and relationships for the firms by the suppliers, including searching; monitoring and negotiating the transactions implementation are significant in economic value (Macher and Richman, 2008). That means the firms incur transaction costs on the effort and time spent to explore, select, negotiate and to contract and maintain the relationships with customers or vendors. The governance structure with low transactions costs perform better than the governance structure with high transaction costs (Williamson, 1991). Information technology adoption like e-SCM helps the organizations to explore, select and to maintain the relationships with customers or vendors. Trust also establishes to reduce transaction costs by attaining flexibility in the dynamic business environment (Barney and Hansen, 1994; Dyer, 2002). Based on transaction cost theory adoption of technologies like e-SCM would help the firms to collaborate and share quality information to

reduce transaction costs and increase profitability. e-SCM would also help the firms to focus more on the complex products and monitor their frequency, which in turn helps them to reduce costs.

There exist a small number of studies that covered to analyze the factors influencing e-SCM adoption (Lin., 2014; Ke et. al. 2009; Wu & Chang, 2010). The scarce research investigated the enablers and inhibitors of adoption (Kannabiran and Dharmalingam, 2012); e-SCM adoption intention (Ke et. al.2009); e-SCM adoption. Kannabiran and Dharmalingam, (2012) examined the factors of enablers and the factors of inhibitors of IT adoption in India but there was no attempt to examine the adoption of e-SCM in India. Zhang et al. (2011) presented a comprehensive literature review on the studies combining the constructs on information and communication technologies, supply chain management constructs with the construct of supply chain performance. Vaaland and Heide (2007) examined the extent to which SMEs were ready to meet the challenges of SCM. In his research it was found that SMEs are not as much of expected to adopt modern technologies like e-SCM to support their supply chain activities. Based on inputs obtained from the literature review and interactions with most of the practitioners it was observed that there is a need for an integrated model that would help in examining both the antecedents and consequences of technology adoption i.e. e-SCM adoption.

It was also important to outline a perceptive of the different factors that manipulate the decisions for e-SCM adoption by both SMEs and large enterprises. This area of research is yet to be explored comprehensively in the academic literature particularly in India and more evidences are required to enhance the level of input for decision making in the firms. To the best of the knowledge of the authors, based on the exploration of literature, there is a significant gap and a requirement of empirical research that could explore the factors impacting the adoption of e-SCM applications. Government of India is encouraging SMEs to adopt technology for long term survival in the global markets and alignment with large scale production with the help of sensitization, training and financial incentive support (Baporikar, 2020).Managers developing e-SCM applications also must recognize the factors influencing the e-SCM adoption and market their applications in order to be able to configure, re-configure as well as deploy the resources. In other words, there is a need to build up an incorporated model examining equally the previous circumstances along with consequences of exceptional technology adoption i.e. e-SCM adoption.

Also, Lin. (2014) investigated the factors affecting the adoption of e-SCM across adopters and non-adopters. He emphasized on e-SCM adoption interaction in the Technological Innovation Theory and TOE framework, for which a research model has been proposed. Technological innovation theory says that IT innovation adoption is the adoption of processes, production systems and new methods; which intends to respond speedily to the variations in the external surroundings and improve performance of the firm. e-SCM adoption was an IT innovation adoption for supply chain activities as it transforms business and impacts collaborative relationships. The e-SCM has different features like facilitating cooperative decision making, information exchange and integration of business process in comparison to other information technologies. The author categorized the process of IT innovation adoption, i.e. e-SCM adoption into two stages. The first stage describes the option of the adoption of e-SCM in firms and second is related to the discussion with respect to adoption of e-SCM. Possibility in e-SCM adoption captures if the firms have adopted e-

SCM or not. It stated that the firms face many organizational, technological and environmental challenges to adopt e-SCM though it promises competitive advantage to the firm. To resolve these challenges, it is important to identify the various contextual factors which might be internal or external to the firms that impacts the adoption of e-SCM. Further to study the contextual factors, the Technology-Organization-Environment framework works as a vital theoretical perception (In 2014, Hader, El Mhamedi, & Abouabdellah, 2020). Technological context was the perception of the adopting firm on technological attributes, which was measured using two factors, namely perceived costs and perceived benefits. Organizational context was the descriptive character of the adopting organization, which is measured using three factors (firm size, top management and absorptive capacity). Environmental context refers to the dealings of the adopting firm with Government, supply chain partners and competitors. Environmental context has been measured using two factors (trading partner influence and competitive pressure). ‘

In another study conducted by Almajali et al. (2016) e–SCM impact and influence in the firms on communication and trust was analyzed. The study analyzed the impact of the e–SCM usage had on performance of the manufacturing firms. It was found that trust of vendors and users and usage of technologies have positive impact one-SCM. Moreover, the trust and the usage of technologies have not shown negative impact on firm’s performance. The e-SCM practices of the firms have proven to be a significant mediator impact in the association among firms performance with the trust. However, communication has not shown any significant impact on performance and e-SCM practice has not shown any significant mediation effect between firm performance and its trust. It was found that in the literature a gap exists to observe the impact of factors influencing the adoption of technology like e-SCM in the supply chain of firms. Based on the understanding over the scholarly work the research was conducted with the objective of:

- Explore different factors and dimensions that influence the adoption of the e-SCM by SMEs in India.
- Investigating the impact of the various factors on adoption of e-SCM in the by SMEs in India.
- The observed verification to the impact of e-SCM adoption over firm performance by SMEs in India.

**Hypotheses Development**

To accomplish objectives of research, an exploratory research was performed In the face of benefits promised by the technology adoption, the firms face many challenges to adopt e-SCM. Based on the literature support it was found that several factors enable or disable the firms to adopt e-SCM. They include perceived costs to adopt technology, perceived benefits of adopting technology, threat of losing competitive advantage, support rendered by the Government like incentives to adopt technology especially for SMEs. Also, there are factors such as environmental context that are defined on the basis competitive pressure and government support. Competitive pressure is of losing competitive advantage, forcing firms to adopt and implement e-SCM (Lin., 2014). The government support is a significant antecedent of e-procurement adoption (Li, 2008); e-business use (Gibbs and Kraemer, 2004; Hsu et al. 2006). Based on the objectives and to support the argument that the adoption of e-SCM will help the SMEs to share timely and accurate information, to synchronize the activities of the supply chain and increase performance as well as

towards the requirement for robust frameworks on IT adoption by including government support as an antecedent to IT adoption (Gangwar et. al., 2014; Olievera and Martins, 2011). The hypotheses were stated such as:

**$H_{01}$:** Competitive pressure positively influences the extent of adoption of e-SCM.
**$H_{02}$:** Government support positively influences the extent of adoption of e-SCM.

Supply chain context posits trust, product complexity and supply chain partner pressure. The extent of the adoption of new technology depends on the trust between the supply chain partners (Nadler and Kros, 2010). Trust was created to be an antecedent of adoption of EDI, e-Commerce, e-Collaboration tools (Haung et. al., 2008; Chong et al., 2009a). Product complexity exists if it was complicated to build the products. Products usually have shorter product life cycles and the products need to be customized (Chatterjee and Ravichandran, 2004; Michelino et. al., 2008). Adoption of ERP, e-Collaboration, e-SCM technologies foster speed to reach the market and satisfy changing customer demands by sharing information diagonally the supply chain (Vickery et. al., 2010) if the products are complex. On the basis of above discussion it is hypothesized that-

**$H_{03}$:** Trust has positive influence on the extent of adoption of e-SCM.
**$H_{04}$:** Product complexity positively influences the extent of adoption of e-SCM.
**$H_{05}$:** Supply chain partner's pressure positively influences the extent of adoption of e-SCM.

The organizational context pointed out top management support and intensity of information. Top management support explained the understanding of top management about the importance of e-SCM adoption and the involvement of top management in the e-SCM projects (Lin, 2014). Intensity of information was referred as the degree of information accessible to trade concerning its products and services (Ghobakloo et. al., 2011). If the firms were more intensive about information in industry, then they are more prone to e-SCM adoptive to process the information. So, it was hypothesized that:

**$H_{06}$:** Top management's support facility positively influences the extent of adoption of e-SCM.
**$H_{07}$:** Information intensity positively influences the degree of adoption e-SCM.

Technological context examines IT infrastructure, perceived benefits and perceived costs. The e-SCM promises many direct and indirect benefits to the organizations. The level to which the organizations observe the adoption of e-SCM was beneficial to them was referred to as perceived benefits (Lin, 2014). IT infrastructure identified to the capability of a firm to develop and install the technological properties (Saraf et. al., 2007; Liu et al., 2013; Saarikko, Westergren, & Blomquist, 2020) needed for foundation of e-SCM applications. IT infrastructure was found to be antecedents of the adoption of unlock systems, e-business and ERP (Chau and Tam, 1997; Zhu et al., 2003; Pan and Jhang, 2008). Perceived benefit of technology was confirmed as a positive predictor of EDI, e-business and Website adoption as well as e-Commerce use (Kuan and Chau, 2001; Chau and Tam, 1997; Gibbs and Kraemer, 2004; Hsu et. al., 2006; Olievera and Martins, 2010). If the organizations observe that it's costly to implement unique technology, then there were not expected to implement the technology for utilization. Perceived costs of technology were proven to be predecessors of EDI adoption, e-business usage (Zhu et. al., 2006a; Kuan and Chau, 2001; Khayer, Jahan, Hossain, &

Hossain, 2020).There exists a need to further investigate in these dimensions of e-SCM adoption. So, it was hypothesized that:

**$H_{08}$:** Perceived benefits of e-SCM positively influence the extent of adoption of e-SCM.
**$H_{09}$:** Perceived costs of e-SCM negatively influence the extent of adoption of e-SCM.
**$H_{010}$:** IT infrastructure of e-SCM positively influences the extent of adoption of e-SCM.

The businesses today are functioning in an active market place where firms require countering promptly with the changes in demand. So, the firm must have capable enough internally and junction at its key vendors and customers, to adopt e-SCM for enhancing performance (Kumar, Ganguly 2020). Hence, it is hypothesized that-

**$H_{011}$:** Adoption of e-SCM positively influences the performance of firm.
Therefore, an extensive study to analyze the factors that control the e-SCM adoption in supply chains was carried out and a theoretical framework is developed and presented as-

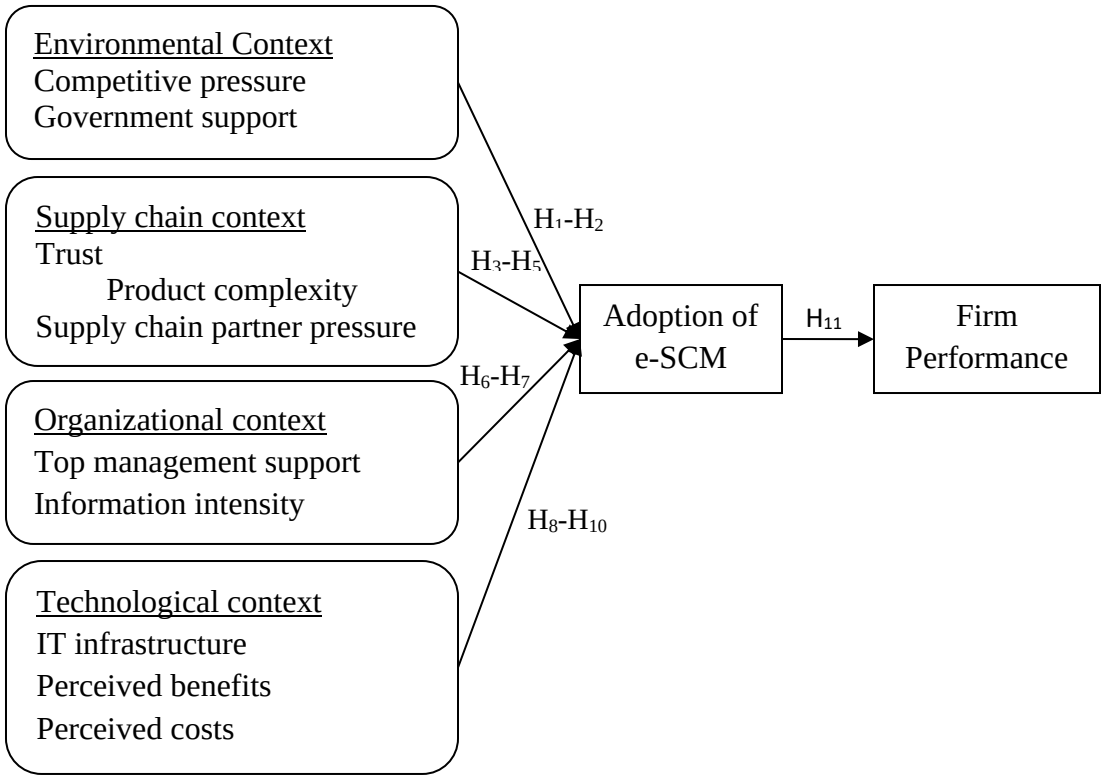


**Figure 1.1 Conceptual Frameworks**

**Research Methodology**

This study includes the constructs "Competitive Pressure, Government Support, Trust, Product Complexity, Partner Pressure, Top management Support, Information Intensity, Supposed Benefits, Supposed Costs, IT infrastructure,

Extent of e-SCM adoption and firm performance. Exploratory in design, the population for the main study was all the top, middle and executive level employees from the SMEs in the state of Uttar Pradesh, India, specifically catering to the power and allied sector. The choice of the sector was based on premise that it is one of the most crucial and uninterrupted supply based sector, and requires higher visibility with accuracy. The Uttar Pradesh is the highly populated state in India and the SMEs account for nearly sixty percent of the industrial output in the state. A sample size of 1500 respondents was identified through a judgmental sampling method and the survey questionnaires were distributed among the respondents. The questionnaires were administered to the target respondents with an envelope of letter describing the purpose of research, details of the respondents who can be the target respondents and the confidentiality statement about the data given by the respondent. The questionnaires were administered to the entire sample. However, only 683 responses were received. Out of these 162 were either wrongly filled or incomplete and thus were discarded. This entire process yielded 521 usable responses through the correct reply ratio with 65%. The demographical analyses of the respondents, the usage of e-SCM by firms and the respondents job function (Table 1.1) were presented.

**Table 1.1: Demographic Profiles-Years of Experience**

| | Parameters | Frequency | % |
|---|---|---|---|
| Years of experience | Less than 2 years | 176 | 34.78 |
| | 2-3 years | 181 | 34.74 |
| | 4-6 years | 97 | 18.62 |
| | 7-10years | 23 | 4.41 |
| | Greater than 10 years | 13 | 2.55 |
| | others | 31 | 5.90 |
| Usage of e-SCM | Less than 2 years | 169 | 32.43 |
| | 3-4 Years | 198 | 38.01 |
| | 5-6 years | 98 | 18.81 |
| | Greater than 6 years | 32 | 6.15 |
| | others | 24 | 4.60 |
| Job function | Procurement | 57 | 10.94 |
| | Distribution/logistics | 99 | 19.01 |
| | Production | 78 | 14.97 |
| | IT /IS function | 94 | 18.04 |
| | Supply chain | 112 | 21.49 |
| | Sales | 44 | 8.45 |
| | Stores | 11 | 2.11 |

| | | | |
|---|---|---|---|
| | Others | 26 | 4.99 |

The statistical technique that was SEM appropriative to examine the research questions under study. The scales adapted for validity and reliability measures had been conducted for measurement of the psychometric properties. The data collected was first cleaned for missing data and outliers to verify for normal distribution data. For all variables the standard scores were computed to test whether the skewness and kurtosis falls into the acceptable range of +/-2. Later, the data were checked for common method bias (CMB). It was suggested to check for this biasness before proceeding to the analysis (Craighead et al. 2011). Common method bias explains as the variance that is attributed to the measurement method rather than to the constructs of interest (Podaskoff et. al. 2003). To assess this bias, the two statistical approaches were followed; first one Harman's single factor, and other Unmeasured Latent Method Factor as recommended by Podsakoff et al. (2012). To test for the biasness using Harman's single factor test, Exploratory Factor Analysis had been conducted for all the variables.

The average variance extracted (AVE) was computed to test convergent validity (Fornell and Larcker, 1981). The analysis was carried out by conducting Structural Equation Modelling with the help of AMOS 22.0.

**Results**

As per the Table 1.2it is found that the Chi-square difference of multi factor and single factor model was found to become significant (ΔCMIN = 4204.974, ΔDF = 105, ΔCMIN / ΔDF = 40.047). This means that multi-factor model had shown a better model fit (CMIN = 5685.185, DF = 1491, CMIN / DF = 3.813, CFI = 0.921, RMSEA = 0.074, SRMR = 0.096) and meeting the cut-off requirement as compared to single-factor model (CMIN = 9890.159, DF = 1596, CMIN / DF = 6.197, CFI = 0.354, RMSEA = 0.085, SRMR = 0.125). Also, single-factor model had not reflecting adequate model-fit indices as all the indices values were outside the suggested cut-off boundaries (Refer Table 1.2). The dataset for model fit indices were above the index difference cut off criteria of above 0.001 (Bryne and van de Vijver 2010). The results had shown that the information in data was free from Common Method Bias (Table 1.3).

**Table 1.2: Harman's Single Factor Test**

| Model-fit Indices | Cut off criterion | Multi-factor | Single-factor | Difference (Δ) |
|---|---|---|---|---|
| CMIN | -------- | 5685.185 | 9890.159 | 4204.974 |
| DF | -------- | 1491 | 1596 | 105 |
| CMIN / DF | ≤ 4.0001 | 3.813 | 6.197 | 40.047 |
| NFI | ≥ 0.9001 | 0.911 | 0.524 | 0.387 |
| IFI | ≥ 0.9001 | 0.920 | 0.568 | 0.352 |

| | | | | |
|---|---|---|---|---|
| CFI | ≥ 0.9001 | 0.921 | 0.567 | 0.354 |
| RMSEA | ≤ 0.0801 | 0.074 | 0.085 | 0.011 |
| SRMR | ≤ 0.1001 | 0.096 | 0.221 | 0.125 |

Source : Elaborations based on Analysis

**Table 1.3: Common Method Test for Assessing Common Method Bias**

| Measurement Item | Standardized Estimates (Without CMF) | Standardized Estimates (With CMF) | Difference in Standardized Estimates | Common Method Variance |
|---|---|---|---|---|
| ECP1 | 0.750 | 0.717 | 0.033 | 0.109% |
| ECP2 | 0.746 | 0.714 | 0.032 | 0.102% |
| EGS1 | 0.850 | 0.817 | 0.033 | 0.109% |
| EGS2 | 0.810 | 0.784 | 0.026 | 0.068% |
| EGS3 | 0.740 | 0.701 | 0.039 | 0.152% |
| STR1 | 0.764 | 0.728 | 0.036 | 0.130% |
| STR2 | 0.661 | 0.611 | 0.050 | 0.250% |
| STR3 | 0.841 | 0.793 | 0.048 | 0.230% |
| SPC1 | 0.806 | 0.765 | 0.041 | 0.168% |
| SPC2 | 0.839 | 0.800 | 0.039 | 0.152% |
| SPC3 | 0.874 | 0.834 | 0.040 | 0.160% |
| SPP1 | 0.771 | 0.726 | 0.045 | 0.202% |
| SPP2 | 0.767 | 0.723 | 0.044 | 0.194% |
| OTS1 | 0.778 | 0.725 | 0.053 | 0.281% |
| OTS2 | 0.684 | 0.631 | 0.053 | 0.281% |
| OTS3 | 0.711 | 0.661 | 0.050 | 0.250% |
| OII1 | 0.852 | 0.819 | 0.033 | 0.09% |
| OII2 | 0.858 | 0.825 | 0.033 | 0.09% |
| OII3 | 0.789 | 0.754 | 0.035 | 0.122% |
| TPB1 | 0.866 | 0.839 | 0.027 | 0.073% |
| TPB2 | 0.785 | 0.745 | 0.040 | 0.160% |
| TPB3 | 0.796 | 0.754 | 0.042 | 0.176% |

| | | | | |
|---|---|---|---|---|
| TPC1 | 0.874 | 0.839 | 0.035 | 0.123% |
| TPC2 | 0.762 | 0.706 | 0.056 | 0.314% |
| TPC3 | 0.779 | 0.734 | 0.045 | 0.203% |
| TII1 | 0.809 | 0.773 | 0.036 | 0.130% |
| TII2 | 0.689 | 0.642 | 0.047 | 0.221% |
| TII3 | 0.755 | 0.697 | 0.058 | 0.336% |
| EEA1 | 0.755 | 0.713 | 0.042 | 0.176% |
| EEA2 | 0.641 | 0.602 | 0.039 | 0.152% |
| EEA3 | 0.451 | 0.414 | 0.037 | 0.137% |
| EEA4 | 0.647 | 0.600 | 0.047 | 0.221% |
| EEA5 | 0.621 | 0.574 | 0.047 | 0.221% |
| EEA6 | 0.742 | 0.701 | 0.041 | 0.168% |
| EEA7 | 0.312 | 0.267 | 0.045 | 0.202% |
| FP1 | 0.764 | 0.728 | 0.036 | 0.130% |
| FP2 | 0.756 | 0.681 | 0.075 | 0.563% |
| FP3 | 0.515 | 0.452 | 0.063 | 0.397% |
| FP4 | 0.762 | 0.713 | 0.049 | 0.240% |

Source: Authors estimates based on analysis

In consistent conditions if a measurement item or a latent construct produces similar results then it was said to be reliable. This means that reliability was the overall consistency of a measurement item or a construct (Fornell and Larcker, 1981). In this study the values of Cronbach alpha were greater than the cut-off criterion of 0.70 (Table 1.4) exhibiting good reliability of the constructs.

**Table 1.4: Reliability Measures: Internal Consistency**

| Construct | Cronbach's α |
|---|---|
| Environmental Competitive Pressure (ECP) | 0.741 |
| Environmental Government Support (EGS) | 0.884 |
| Supply Chain Trust (STR) | 0.802 |
| Supply Chain Complexity (SPC) | 0.873 |
| Supply Chain Partner Pressure (SPP) | 0.743 |
| Organizational Top-Management Support (OTS) | 0.774 |
| Organizational Information Intensity (OII) | 0.871 |
| Technological Perceived Benefit (TPB) | 0.856 |
| Technological Perceived Costs (TPC) | 0.849 |

| | |
|---|---|
| Technological IT Infrastructure (TII) | 0.792 |
| Extent of E-SCM Adoption (EEA) | 0.884 |
| Firm Performance (FP) | 0.821 |
| Source: Authors estimates based on analysis | |

A test of squared multiple correlation (SMC) was performed to test the reliability of the measured items. Squared multiple correlation was measured by squaring the factor loadings of every measurement item. This signifies the variance explained by each measurement item of its respective construct (Fornell and Larcker (1981). In this study as shown in table 1.5 below SMC meets the cut off criteria for all the measurement items which show that the measures are reliable (Bagozzi and Yi, 1988).

**Table 1.5: Reliability Measure – Squared Multiple Correlation (SMC)**

| Construct | Measurement Item | Factor Loadings | SMC |
|---|---|---|---|
| Environmental Context- | ECP1 | 0.773 | 0.598 |
| Competitive Pressure (ECP) | ECP2 | 0.76 | 0.578 |
| Environmental Context - | EGS1 | 0.869 | 0.755 |
| Government Support (EGS) | EGS2 | 0.856 | 0.733 |
| | EGS3 | 0.814 | 0.663 |
| Supply Chain Context – Trust | STR1 | 0.772 | 0.596 |
| (STR) | STR2 | 0.666 | 0.444 |
| | STR3 | 0.825 | 0.681 |
| Supply Chain Context – Complexity | SPC1 | 0.807 | 0.652 |
| (SPC) | SPC2 | 0.834 | 0.695 |
| | SPC3 | 0.86 | 0.74 |
| Supply Chain Context – Partner | SPP1 | 0.772 | 0.596 |
| Pressure (SPP) | SPP2 | 0.765 | 0.585 |
| Organizational Context – Top | OTS1 | 0.779 | 0.607 |
| Management Support (OTS) | OTS2 | 0.685 | 0.469 |
| | OTS3 | 0.726 | 0.527 |
| Organizational Context – | OII1 | 0.85 | 0.723 |
| Information Intensity (OII) | OII2 | 0.857 | 0.734 |
| | OII3 | 0.785 | 0.616 |
| Technological Context – Perceived | TPB1 | 0.871 | 0.759 |
| Benefit (TPB) | TPB2 | 0.783 | 0.613 |
| | TPB3 | 0.791 | 0.626 |

| | | | |
|---|---|---|---|
| Technological Context – Perceived Costs (TPC) | TPC1 | 0.879 | 0.773 |
| | TPC2 | 0.76 | 0.578 |
| | TPC3 | 0.781 | 0.61 |
| Technological Context – IT Infrastructure (TII) | TII1 | 0.81 | 0.656 |
| | TII2 | 0.685 | 0.469 |
| | TII3 | 0.746 | 0.557 |
| Extent of E-SCM Adoption (EEA) | EEA1 | 0.835 | 0.697 |
| | EEA2 | 0.79 | 0.624 |
| | EEA4 | 0.778 | 0.605 |
| | EEA5 | 0.65 | 0.423 |
| | EEA6 | 0.807 | 0.651 |
| Firm Performance (FP) | FP1 | 0.791 | 0.626 |
| | FP2 | 0.757 | 0.573 |
| | FP4 | 0.782 | 0.612 |

Source: Authors estimates based on analysis

**Table 1.6: Model-Fit Indices – The Measurement Model**

| Model Fit | Cut-off criterion | Measurement Model |
|---|---|---|
| CMIN/Df | ≤ 4.0001 | 12.2321 |
| GFI | ≥ 0.9001 | 0.9251 |
| AGFI | ≥ 0.9001 | 0.9051 |
| NFI | ≥ 0.9001 | 0.9451 |
| IFI | ≥ 0.9001 | 0.9571 |
| CFI | ≥ 0.9001 | 0.9571 |
| RMSEA | ≤ 0.0801 | 0.0411 |
| RMR | ≤ 0.001 | 0.0881 |
| SRMR | ≤ 0.0801 | 0.0361 |

Source: Authors estimates based on analysis

The Convergent and Discriminant validity were conducted to verify the validity of the constructs. Convergent validity of a construct had been examined through calculating Average Variance Extracted (AVE) and checking for the cut-off criteria of more than 0.5 for adequacy of results (Hair et al. 2006). The diagonal elements in the table 5.6 were greater than non-diagonal elements. Hence, Discriminant validity had been established (Hair et al. 2006)..

**Table 1.7: Average Variance Extracted and Correlation Matrix**

| Construct | ECP | EGS | STR | SPC | SPP | OTS | OII | TPB | TPC | TII | EEA | FP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ECP** | **0.767** | | | | | | | | | | | |
| **EGS** | 0.722 | **0.847** | | | | | | | | | | |
| **STR** | 0.449 | 0.608 | **0.757** | | | | | | | | | |
| **SPC** | 0.241 | 0.276 | 0.491 | **0.834** | | | | | | | | |
| **SPP** | 0.50 | 0.480 | 0.480 | 0.498 | **0.768** | | | | | | | |
| **OTS** | 0.338 | 0.305 | 0.336 | 0.370 | 0.241 | **0.731** | | | | | | |
| **OII** | 0.485 | 0.413 | 0.525 | 0.415 | 0.508 | 0.421 | **0.831** | | | | | |
| **TPB** | 0.576 | 0.475 | 0.379 | 0.331 | 0.421 | 0.389 | 0.664 | **0.815** | | | | |
| **TPC** | 0.353 | 0.330 | 0.342 | 0.570 | 0.328 | 0.323 | 0.493 | 0.337 | **0.808** | | | |
| **TII** | 0.627 | 0.509 | 0.493 | 0.378 | 0.400 | 0.459 | 0.662 | 0.547 | 0.437 | **0.749** | | |
| **EEA** | 0.167 | 0.012 | 0.086 | 0.095 | 0.028 | 0.283 | 0.123 | 0.197 | 0.007 | 0.144 | **0.775** | |
| **FP** | 0.241 | 0.439 | 0.228 | 0.230 | 0.041 | 0.165 | 0.044 | 0.404 | 0.523 | 0.423 | 0.585 | **0.777** |

Construct reliability was presented and the values were acceptable as per the above specified recommendations.

**Table 1.8: Construct Reliability**

| Construct | Cronbach's α |
|---|---|
| Environmental Competitive Pressure (ECP) | 0.740 |
| Environmental Government Support (EGS) | 0.884 |
| Supply Chain Trust (STR) | 0.800 |
| Supply Chain Complexity (SPC) | 0.873 |
| Supply Chain Partner Pressure (SPP) | 0.743 |
| Organizational Top-Management Support (OTS) | 0.774 |
| Organizational Information Intensity (OII) | 0.870 |
| Technological Perceived Benefit (TPB) | 0.856 |
| Technological Perceived Costs (TPC) | 0.849 |
| Technological IT Infrastructure (TII) | 0.792 |
| Extent of E-SCM Adoption (EEA) | 0.882 |
| Firm Performance (FP) | 0.820 |

Source: Authors estimates based on analysis

**Table 1.9: Model Fit Indices – Structural Model**

| Model Fit | Cut off criterion | Measurement Model |
|---|---|---|

| | | |
|---|---|---|
| CMIN/Df | ≤ 4.000 | 2.199 |
| GFI | ≥ 0.900 | 0.931 |
| AGFI | ≥ 0.900 | 0.901 |
| NFI | ≥ 0.900 | 0.952 |
| IFI | ≥ 0.900 | 0.961 |
| CFI | ≥ 0.900 | 0.960 |
| RMSEA | ≤ 0.080 | 0.040 |
| RMR | ≤ 0.100 | 0.080 |
| SRMR | ≤ 0.080 | 0.030 |

Source: Authors estimates based on analysis

**Table 1.0: Path Analysis – Results**

| Hypothesis No. | Relationship | Standardized Path Coefficients | p-Value |
|---|---|---|---|
| $H_1$ | ECP → EEA | 0.321** | 0.008 |
| $H_2$ | EGS → EEA | 0.165* | 0.067 |
| $H_3$ | STR → EEA | 0.393*** | <0.001 |
| $H_4$ | SPC →EEA | 0.208** | 0.026 |
| $H_5$ | SPP →EEA | 0.174* | 0.078 |
| $H_6$ | OTS → EEA | 0.452*** | <0.001 |
| $H_7$ | OII → EEA | 0.234** | 0.015 |
| $H_8$ | TPB → EEA | 0.365*** | <0.001 |
| $H_9$ | TPC → EEA | - 0.248** | 0.011 |
| $H_0$ | TII → EEA | 0.023(ns) | 0.086 |
| $H_{11}$ | EEA → FP | 0.812*** | <0.001 |

Note: [a]*** means p<0.001, ** means p<0.05, * means p<0.0, and (ns) means the hypothesis was not significant at 0% significance level.

Based on the analysis it is found that there exists significant positive relationships between factors of environmental context and e-SCM adoption by analysing the sign of path coefficient and p-value of table 1.9 i.e., hypothesis-1 and hypothesis-2 had shown a significant positive impact on extent of e-SCM adoption. However, $H_1$ was significant at 5% level of significance and $H_2$ at 0% level of significance. The factors of supply chain context also had shown a significant positive impact on the extent of e-SCM adoption. This means that hypothesis-3, hypothesis-4 and hypothesis-5 had shown a significant positive impact onto the extent of e-SCM adoption. The factors of organizational context also had shown a significant positive impact on the extent of e-SCM adoption. This means that hypothesis-6 and hypothesis-7 had shown significant positive impact on the extent of e-SCM adoption. Perceived benefits of technological context had shown significant positive impact on e-SCM adoption ($H_8$). Perceived costs had shown an

insignificant positive impact on e-SCM adoption ($H_9$). However, IT infrastructure was insignificant ($H_0$). The adoption of e-SCM had shown significant positive impact on the firm performance ($H_{11}$).

**Discussion**

The obtained results of common method bias have shown that the data is not suffering from biasness. The results of reliability and validity have shown that the data established the reliability and validity. The results of the confirmatory factor analysis have shown unidimensionality of the constructs. To test the environmental context factors which affect extent of the adoption of e-SCM, two factors namely, the competitive pressure and government support were studied. The path analysis results have shown a significant positive impact of both to the extent of adoption of e-SCM. Hence, in the current business atmosphere it is evident that the firms are under pressure to develop unique capabilities like adoption of e-SCM to attain competitive advantage. The firms experience competitive pressure to the adoption of e-SCM. Further, with the Government support the firms adopt e-SCM.

To test the consequence of supply chain context on the extent of e-SCM adoption three factors namely trust, product complexity and partner pressure were examined. The results have shown that there exists a significant positive impact of all three on the extent of adoption of e-SCM. Hence, e-SCM adoption will foster speed to reach the market and satisfy changing customer demands by sharing information across the supply chain which helps to build trust, especially when the products are complex to build. Moreover, firms adopt e-SCM if they experience supply chain partner pressure.

The effect of organizational context on the extent of adoption of e-SCM is tested with two factors namely the top management support and Information Intensity. The analysis has revealed a significant positive impact of both of them on the degree of adoption of e-SCM. Support of top management acts a major task in value creation through e-SCM adoption for supply chain management. The results also emphasized that top management support plays a major role in e-SCM adoption. Moreover, firms in information intensive industries like electricity generation and distribution are very much prone about adoption of e-SCM to process the information. The same is evident from the results of path analysis.

Technological context is examined with perceived costs, perceived benefits and IT infrastructure. The perceived benefits have shown a significant positive impact, the perceived costs have shown a significant negative impact but IT infrastructure did not show any significant impact on the extent of adoption of e-SCM. e-SCM helps the organizations to share information among the supply chain partners. The e-SCM also helps to increase the sales revenue to attain competitive advantage and the firms perceive benefits from e-SCM adoption. The results have shown a significant positive impact. Then again, the perceived costs have shown the significant negative impact. So, when the firms experience less cost and more benefits, they adopt e-SCM. IT infrastructure has not shown any significant impact on e-SCM adoption. IT infrastructure is the potential of a firm to extend and install technological resources. This is a mechanism to adopt e-SCM rather than the outcome.

Further, the adoption of e-SCM has shown a significant positive impact on firm performance. Hence, it is evident from the results that the adoption of e-SCM will help the firms to work together with their supply chain partners by sharing crucial information, which will in turn make them agile and to deliver convenience to the customers. Since, e-SCM helps the firms to share the crucial information among the supply chain partners right from product planning and design to procurement of raw materials, transport, delivery, warehousing and till the product reaches the customers. This will help them to strategically plan for supply, demand and fulfilment. This may help the managers to steer the SMEs in improving their performance. Thus the factors identified have managerial implications in redefining the impact of benefits that can be gained based on adoption of e-SCM and improving the visibility of material or services delivery that shall help in gaining the trust of the various stakeholders.

## Conclusion

The paper explores the factors that influence the adoption of the e-SCM in the SMEs and influence their performance. It is established that the adoption of e-SCM in the SMEs is based upon the factors such as government support, competitive pressure and rivalry, to infuse trust among the customers and gain the confidence of the customers as well as deal with the complexity related with the delivery of product or services. It is also influenced by the pressure created by the partners, and alliances in order to improve the efficiency and performance. The pressure of minimizing the waste and benefits of reduced cost also influence the adoption of the e-SCM. The adoption of e-SCM in a SMEs is also based on the experience and commitment of the top management. The top management if sensitized regarding the improved visibility of resources and delivery mechanism and cost based benefits and gains of the information intensity, shall influence the adoption of e-SCM in the organisation. The results are in consistency with the available literature. The paper explains that the adoption of the e-SCM has a positive impact on the performance of the firms. It improves the visibility of the resources and material as well as ensures the timely delivery of the services and products to the customer/ client. However, the study needs to be further appended with the future research in the large enterprises as well as more case based evidences. Also it would be interesting to experiment and establish the causal relationship of the factors that influence the adoption of the e-SCM in the firms. It would be beneficial for the practitioners and the researchers to further understand the specific benefits and outcomes of adoption along with the process of adoption.

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