Role of Agile and Lean Supply Chain Strategy on Firm Performance: Evidence from Drinking-Water Industry of Sindh, Pakistan

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ABSTRACT

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Keywords

JEL Classification
L00, L10, L25

Purpose: The objective of present was to determine the role of agile and lean supply chain strategy on firm performance in drinking-water industry of Sindh, Pakistan. For obtaining the research objective of this study primary data gathered through questionnaire from previous studies.

Design/Methodology/Approach: Questionnaire was self-administered and printed questionnaire distributed among employee which are working in the drinking-water industry of Sindh, Pakistan. Total 200 questionnaires were distributed among only 180 received back complete filled. Hence, the response rate was 90% which good response rate for concluding findings of present study. Reliability analysis performed in SPSS version 25 but hypotheses were tested via multiple regressing analyses in AMOS version 25.

Findings: Findings, confirmed positive and significant impact of agile and lean supply chain strategy on firm performance in drinking-water industry of Sindh, Pakistan. However, the agile supply chain strategy has more significant impact on firm performance due to higher beta value.

Implications/Originality/Value: Based on limited knowledge of authors, this is the first study which applied resource based-view theory in context of drinking water industry of Sindh, Pakistan.

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Introduction
The instability into drinking water industry has been observed from both perspectives downstream as well as upstream (Giri & Bardhan, 2014). In regards, many firms in drinking water have adopted the agile and lean strategy in their supply chain strategies for addressing the instability into drinking water strategy. However, the consumers always look for the flexible supply chain in this competitive industry due to easy to entry of new suppliers (Gligor et al., 2015 & Blome et al., 2013). The agile SCS plays an important used for launching the innovative product among the competitive market in order to retain into industry (Qi et al., 2011). This strategy only be implemented if, a quick response shown by the firms with necessary adjustments (Yusuf et al., 2004). In addition, the recent economic conditions of Pakistan the supply chain disruption are the on peak. It is necessary for the firms for the survival into industry to response these uncertainties through quick and supply chain strategies such as the lean SCS and agile SCS for long run survival with better bottom-line (Tse et al., 2016; Junejo et al., 2022). The drinking-water bottle firms mainly depend on plastic pellets which are very expensive nowadays due to instability of oil prices and exchange rate particularly in developing countries like Pakistan (Abiodun et al., 2021; Rehmani, and Siddiqui, 2019). The economic problems should be addressed through the effective supply chain strategies (Sugeng et al., 2010).

Furthermore, the supply chain strategies including the agile and lean supply chain strategy if not managed then firm performance is mainly affected badly (Dobrzykowski et al., 2016&Bevilacqua et al., 2017). There are numerous studies also revealed that the lean supply chain strategies are important for the stable supply chain performance which will enhance the firm performance in terms of inventory cost and reducing waste so on (Prajogo et al., 2016; Nawanir et al., 2013; Chavez et al., 2015;Antony et al., 2012). In addition, the case of failure agile SCS also leads to diseconomies of scale that ultimately lose the cost leadership among industry (Gligor et al., 2015; Um, 2017). Besides, the internal importance of these strategies, they also play vital role to fulfill the customer requirements through effective and efficient response supply chain (Tse et al., 2016; Martinez-Sanchez & Lahoz-Leo, 2018;Chan et al., 2017;Alzoubi & Yanamandra, 2020 & Eckstein et al., 2015;). The objective of this study is in order to fill the research gap the role of agile and lean supply chain strategies on firm performance in drinking-water firms in Sindh, Pakistan have been studied.

Literate review
Theoretical Framework
The research based-view theory suggested that the long run strategies can benefit the firm in long run (Barney, 1991). In this regard, the supply chain strategies including the agile and lean supply chain strategies can improve the overall financial performance of firm. The effective supply chain strategies can improve the customer responsiveness as bottom-line supply chain performance leads to firm performance (Melnyk et al., 2010). Lean SCS and agile SCS can benefits to firms in various ways are answer time, lithe supply chain capabilities and cost (Yusuf et al., 2004 & Qi et al., 2011). The lean supply chain strategy basically covers the overall supply chain effectiveness whereas the agile mainly focus on overall competitive advantage in competitive market (Ben et al., 1999). Therefore, the present study the two supply chain strategies lean and agile have been drawn from the theory of resource based-view theory for examining the role on firm performance financial performance in drinking-water industry in Sindh, Pakistan.

Past Studies and Hypothesis Development Lean
There are various forms of lean supply chain such as TQM (total quality management), JIT (just in time) and Kanba (Ardalan & Diaz, 2012).According to Bortolotti et al., (2015), through the TQM the lean can be achieved in supply chain which will reduce the overall cost of respective firm. The effective lean also can decrease the great level of rework and defects within firm (Yin et al., 2016). The implementation of lean supply chain strategy is better due to higher reduction of
cost of raw material (Shah et al., 2020). The lean supply chain strategy usually helps in the reducing the overall inventory cost and as results better turnover of finished products produced (Shashi et al., 2019). In addition, the manufacturing firms save the cash flows from raw material with proper implementation of lean supply chain strategy within firm. Thus, the following hypothesis is suggested:

**H1:** Lean supply chain strategy positively related to firm performance.

**Agile**

There are two important aspects of agile supply chain strategy: the timely supply of goods and services to market and to gain competitive advantage among competitive industry through meeting the customer expectations and introducing new products with key current demand of market (Lee, 2004; Whitten et al., 2012). In addition, the various advantages also cannot be ignored including loading time, schedule sharing and inventory mobility so on (Swafford et al., 2006 & Awasthi & Omrani, 2019). The agile supply chain strategy mainly addresses the problems of supply chain dynamic and response the supply chain with current situation (Qrunfleh & Tarafdar, 2014). Furthermore, all the efforts of agile supply chain strategies end results are the better firm’s financial performance (Chan et al., 2017). The full rate or replenishments also can be achieved through effective implementation of agile supply chain strategy within firm. Therefore, the following hypothesis has been developed.

**H2:** Agile supply chain strategy positively related to firm performance.

**Methodology**

The primary data is gathered from drinking-water bottled firms of Sindh, Pakistan, which are operating in Karachi. The middle level and top-level employees were targeted. The data has been obtained on printed self-administrated questionnaire. Total 200 employees was requested to fill the questionnaire. However, 180 questionnaires were completely filled; hence the response rate was 90 percent.

The questionnaire was taken from the past studies in order to measure construct such as lean supply chain strategies so on. This study is based on convenience and snow ball sampling strategies which are type of non-probability sampling type. These sampling strategies were chosen due to time and non-participative behavior of respondents for this research. There are three variables are considered in this study one dependent variables (financial performance) and two independent variables (Lean supply chain strategy and agile supply chain strategy). The questionnaire was consisting of five likert scale ranging from negative strongly disagree to positive strongly agree (1 to 5). Lean supply chain four items were adopted from the study of (Qi et al., 2017). Items were based “supply chain reduces any wastes; selects supplier based on cost; selects supplier based on quality; has to maintain a long relationship of suppliers”. The agile supply chain strategy was taken from the study of (Qrunfleh & Tarafdar, 2013). Research items were “supply chain provides the customer with customized products; selects supplier based on flexibility; selects supplier based on responsiveness; has to maintain a short relationship of suppliers”. Lastly, the financial performance was taken from the study of (Chan et al., 2017). The four items were “Return on Investment (ROI), Return on Asset (ROA), production cost, Return on Sales (ROS)”.

**Results & Discussion**

**Profile of Respondents**

Table 1 represents the profile of respondents. There are 3 categorized are given below including the gender of respondents, age of respondents and work experience of respondent. In the first category gender of respondents’ female employee are consists of 83 and male employees are
consisting of 97 respectively. Second category, age of respondents is consisting of less than 25 years 105, 26-35 years 47, 36-45 years 19 and 46-above are 18 respectively. Lastly, work experience of respondents less than 5 years 126, 5-10 years 26, 11-16 years 14 and 17-above 14 respectively.

### Table 1: Profile of Respondents

<table>
<thead>
<tr>
<th>Gender of respondent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>83</td>
<td>46.1</td>
</tr>
<tr>
<td>Male</td>
<td>97</td>
<td>53.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age of respondent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 25 years</td>
<td>105</td>
<td>58.3</td>
</tr>
<tr>
<td>26-35 years</td>
<td>47</td>
<td>26.1</td>
</tr>
<tr>
<td>36-45 years</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>46 and above</td>
<td>18</td>
<td>5.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work experience of respondent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>126</td>
<td>70.0</td>
</tr>
<tr>
<td>5-10 years</td>
<td>26</td>
<td>14.4</td>
</tr>
<tr>
<td>11-16 years</td>
<td>14</td>
<td>7.8</td>
</tr>
<tr>
<td>17yrs and above</td>
<td>14</td>
<td>7.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Authors’ Estimation

### Reliability Analysis

The Table 2 represents the reliability analysis of gathered data through adopted questionnaire. It is important to calculate the internal consistency of all collected data (Sekaran and Bougie, 2010). The key decision to be taken is the value of Cronbach alpha value which is suggested by Hair et al., (2014) should be 0.70. If, all the studied variables found to have Cronbach’s alpha value equal or greater than 0.70 than it can be conclude the research instrument is reliable. You can notice in our study all variables have Cronbach’s alpha value greater than 0.70. However, the highest value of Cronbach’s alpha value is .0896 (Firm performance) and lowest value of Cronbach’s alpha value is .838 (Agile supply chain strategy).

### Table 2: Reliability Analysis

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cronbach’s Alpha</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Performance</td>
<td>0.896</td>
<td>4</td>
</tr>
<tr>
<td>Agile supply chain strategy</td>
<td>0.838</td>
<td>4</td>
</tr>
<tr>
<td>Lean supply chain strategy</td>
<td>0.881</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Authors’ Estimation

### Hypothesis Testing

The multiple regression analysis was applied in AMOS version 25 for measuring the impact on independent variables (agile supply chain strategy and Lean supply chain strategy) on dependent variable firm performance. The results of present study are shown in Table 3. Findings revealed that all agile supply chain strategy and lean supply chain strategy are found to have positive and significant impact on firm performance (beta value = 0.332, p<0.05) and (beta value= 0.513, p<0.05) respectively.

Furthermore, it is necessary to measure the issue of multicollinearity among independent variables because if there is high collinearity among independent variables than the results of regression analysis usually considered as the overestimated (Hair et al., 2014). Thus, in the present study you notice all VIF (variance inflation factor) values are less than suggested value 5. Therefore, the current results are not overestimated.
Table 3: Multiple Regression Analysis

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variable</th>
<th>Value of Beta (Standard coefficient)</th>
<th>Significance Value</th>
<th>VIF</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Performance</td>
<td>Agile supply chain strategy</td>
<td>0.332</td>
<td>0.000</td>
<td>1.394</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td>Lean supply chain strategy</td>
<td>0.513</td>
<td>0.000</td>
<td>1.394</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note: **Significance level at 0.05
Source: Authors’ Estimation

Figure 1: Multiple Regression Analysis (Path Directions)

Discussion and Theoretical Implication
The present study’s findings are aligned with previous studies. The lean SCS has the influences on the financial performance (Nawanir et al., 2016; Prajogo et al., 2016; Shashi et al., 2019). Similarly, the agile supply has significant impact on financial performance, the findings are confirmed by other research scholars as well (Wahyuni et al. 2020; Martinez-Sanchez and Lahoz-Leo 2018; Tse et al., 2016; Eckstein et al., 2015& Chan et al., 2017).

In the present study theory of resource-based view theory is related to two important supply chain strategies including lean supply chain strategy and agile supply chain strategy in order to confirm the financial performance of water-bottled industry of Sindh, Pakistan. In order to fill the theoretical gap a research model is developed and checked. Empirical findings, suggested that the resource-based theory outcomes are aligned with lean supply chain strategy and agile supply chain strategy such as timely delivery of raw material, proper scheduling and effect use of scare resources so on. In long run through applying these strategies various bottom line can be achieved such delivery of finished products on time, better sales projections and better cash flows in terms of financial performance.

Concluding Remarks and Future Research Directions
The key objective of present was to examine the role of agile supply chain strategy and lean supply chain strategy on financial performance of drinking-water firms based on Sindh, Pakistan. Primary data gathered via research instrument questionnaire. Findings, revealed that there is statically significant impact of both agile supply chain strategy and lean supply chain strategy on financial performance of drinking-water firms based on Sindh, Pakistan. Furthermore, the lean supply chain strategy is more positive and significant on financial performance as compare to agile supply chain strategy due to higher beta value.
There numerous limitations of present study which open doors for the future researchers. This study based on cross-sectional research design but in future longitudinal study design can be applied for confirming the existing findings of study. Second, present study is based on a single industry so the results cannot be generalized for the entire manufacturing. Third, mediation effect can be checked through a complex research model.

References


