Investigating Supply Chain issues in the Food Processing Industry

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Abstract. With the recent increase in the complexity of food industries, numerous issues including rapid changes in taste and demand for food supplies are on the rise, particularly in developing countries. Aim: This research study was aimed at investigating supply chain management issues in food processing industries and influence of these factors on business performances. Methods: Research data from respondents was collected using online social platforms and Statistical Package for Social Sciences (SPSS) was employed to analyses the data. Results: Research findings indicated that factors including human resource management, technology, facility issues, and customer relations negatively influence business performance. Conclusion: Findings also reflect that human resource management issues represent a significant driver for improving performance of the food industries. This research study offers insight regarding barriers and drivers influencing the operations of food processing industries and what measures should be taken accordingly. Keywords: Supply Chain Management Problems, Business Performance, Food Industry

1. Introduction

Pakistan is among one of the emerging economies in Asia [1],[2]. Nonetheless, the progress of supply chain operations lags far behind than numerous other Asian countries including India, Bangladesh, China and Japan owing to various problems [3]. Lack of advancement in the transport system and minimal utilization of modern technology in supply-chain management of food processing industries lead to significant economic loss in daily based business operation [4], [5].

According to (Patel and Deshpande, 2015), irregularities within food industries occur due to several logistical, social and economic factors aligned with the supply chain. Research studies have indicated how essential it becomes to increase productivity by improving the supply chain management issues[6].

Food Industries in Pakistan are not often well equipped with adequate supply chain operations. As the population of Pakistan continues to grow so are the problems in transportation and fulfilment of demand in food industries[7]. Instances of these problems include: diverse consumer tastes and
requirements, the need for sustainable policies and the need to meet cold supply chain requisites in food transport [8]. The common existence of these difficulties front food processing industry with the competition to progress and evolve to meet requirements of customers [9, 10]. In spite of its weighty contributions, Pakistan’s food processing industry is facing different problems hindering its economic growth. The food processing industry faces high frequencies of dynamic customer requirements and preferences effecting the possible progress and revenue generated by businesses. Despite the acknowledged benefits of the supply chain operations, its implementation has not been carried out on a significant scale particularly in the food industry. Therefore, to foster the rapid adoption of supply chain operations, it is vital to analyse the factors influencing its progress. The aim of this study is, therefore to inspect the problems related to supply chain management in the food processing industry of Pakistan and how these problems influence business performance. This research focuses on developing a theoretical model highlighting the key inhibitors of supply chain operations using a survey method. Based on the research findings and data analysis using SPSS, empirical validation of proposed factors has been carried out.

2. Literature Review

2.1. Supply chain management problems
Supply chain management in the food processing industry primarily facilitates the effective movement of essential materials and information as well as the transport of the end product from distant factories to customers’ local markets [11]. Supply chain management include logistics and transportation, operations management, materials and distribution management and marketing [12]. Research studies suggest that it is quite important to handle the problem of supply and demand correlation with all parties of business [13].

Now a days, customers are demanding more differentiated, higher quality products with higher levels of service at adequately low prices[14]. Therefore, supply chain management needs to be more effective in terms of ease and accuracy of the overall operation.

According to Hoffman, supply chain continues to struggle due to risk management issues caused by the external environmental factors as well as the factors threatening chaos within the supply chain[15]. These risks can originate from customers, suppliers or the internal environment and consists of natural disasters, political and economic developments, changes to legislations and regulations, technological developments and the ability to respond to human behaviour[15, 16].The intense struggle for market share is a major issue within the supply chain. Another study [17], highlighted the absence of buyer-supplier trust and cooperation, supplier competencies, and interpersonal relationships as key barriers to supplier’s performance.

2.2. Business performance
In this era of electronic commerce and commercial globalization, business analytics is gradually becoming a central source of competitive advantage for enterprises[18]. Business performance can be seen as a company’s ability of achieving set goals. Depending upon the end of business period results, business performance is a depiction of the level of work performed within the set out goals[19]. For a business to be successful, all owners or managers must ensure that the business operates as effectively and proficiently as possible. Nevertheless, improving the efficacy and proficiency of a business requires knowledge and foresight of the most critical elements of business operations and the preparedness to implement practices that enhance these crucial elements [20-22].

The improvement in supply chain performance is directly related to an individual business organization’s performance which is operating in that supply chain [22].Successfully managing the supply chain performance results in improved communication, productivity, operational and strategic monitoring, problem solving and better decision making for businesses which ultimately results in a better supply chain management system[23, 24].
Based on the above discussion, it becomes clear that by improving supply chain management, business performance will also improve and contribute significantly to the economy. Therefore, it is important to identify which factors are inhibiting the growth in supply chain management of food processing industries and we can mitigate the effects of these issues in the food processing Industry of Pakistan. This research study has included several variables including Human Resource Management Problems, Technology Related Problems, Facility Related Problems, Customer Relation Management Problems, Supplier Relation Management Problems, Regulatory factors and Transportation and logistics problems for obtaining better insight into food processing industry. In light of the above discussion, this research study has presented a brief overview of factors which might influence the business performance of the food processing industry of Pakistan:

2.2.1. Human Resource Management Problems (HRM). HRM refers to the effective management of the people in an organization. It is a strategic approach that helps in providing a competitive advantage. The main purpose of HRM is to make sure that the firm achieves optimal success through people. Imposing proper recruitment and training methods, developing the abilities of employees and choosing the right person for a job can lead to improving the business’s performance [25].

2.2.2. Technology Related Problems (Tech). Technology helps businesses to test new concepts, control market access opportunities and become more competitive. Businesses attract new demands and improve market activities and products due to technological advancements [26]. Technological management creates new values, new products, new processes and improve workflows that enables business prosperity [27, 28].

2.2.3. Facilities (Fac) and business performance. A poor facility also represents a major issue affecting the performance of the business and constraining its success. Generally, business performance plummets due to the lack of state-of-the-art facilities and could cause delays to the sourcing and supply processes of a business [29]. Facilities having poor layout and design can lead to safety and health hazards for employees [9].

2.2.4. Supplier relationship management (SRM) and business performance. While outsourcing of logistics and manufacturing helps expand distribution channels, this in turn gives rise to more and more complex and dynamic supply chains. It has become more apparent to improve the supplier and buyer relationship to survive and thrive in the world of business [30]. Procurement strategies such as cost reduction, predictable procurement and control over negotiations can be developed through a better supplier relationship management [31, 32].

2.2.5. Customer relationship management (CRM) and business performance. Effective management of customer relationships represents a major problem in business competitiveness. Businesses often demand adequate data about customers and their requirements [33]. Customer relationship management and business performance essentially depend upon the effective and efficient utilization of knowledge resources. Therefore, the effectiveness of customer relationship management depends upon usefulness of the integration of the knowledge management process. Managers have to understand the importance of customer relationship management marketing strategy to sustain and gain edge over the competitors [34].

2.2.6. Regulatory factors (RF) and business performance. Legal factors influencing business include all regulatory and law indicators that can influence negatively or positively to the results obtained for market actions and decisions of the management of company operating in a particular country [35, 36]. Research studies have shown that regulatory factors affect the business performance negatively which is why questions relevant to these issues have been integrated in to the survey to obtain a brief idea as to whether they affect the business performance or not in context of a developing country [37, 38].
2.2.7. Transportation and Logistics (Log) and business performance: During the transportation of food products, these products must be placed in a closed container free of debris and odour as the presence of any contaminate could permeate packaging and ruin the goods being shipped [39]. Refrigerated vehicles are very essential for the transportation of perishable and freeze products [40]. Consumers are becoming increasingly selective about food products and prefer to opt high-quality products. It doesn’t take them much time to switch from one brand to another because of the lack of quality. Therefore it becomes important to investigate whether food processing industries incorporate sufficient measures to ensure quality of products [41].

In the light of literature review of above-mentioned factors and correlation of these factors with business performance, following research model is proposed in figure 1:

![Figure 1. Research Model](image)

In this research study, business performance is measured using return on investment, revenue growth, profit growth, customer satisfaction, and employee satisfaction as subjective measures which is in accordance with study conducted by [42].

3. Methods
Research data has been gathered from different food processing industries in Punjab and Khyber Pakhtunkhwa. The respondents were selected because of their extensive knowledge regarding supply chain operations in the food processing industry and its working environment.

3.1. Data Collection
The sample for this research study consisted of 302 respondents including operators, supervisors, and managers. Data collection of self-administered questionnaires was completed in one month and a total 500 questionnaires were distributed. The questionnaires for this research was split into two sections. Section A was based upon the demographic details of respondents. The results of section A are presented in Table 1. From Table 1, it can be seen that majority of respondents were males. Highest percentage regarding employment of respondents was observed between 2-5 years. It can also be seen that majority of respondents held managerial positions. Based on responses obtained from these respondents, further assessment of collected data was carried out.
Table 1. Demographic Details of Respondents

| Variables          | Categories    | Total (N) | Percentage % |
|--------------------|---------------|-----------|--------------|
| Gender             | Male          | 253       | 83.8         |
|                    | Female        | 49        | 16.2         |
| Age                | 18–25         | 101       | 33.4         |
|                    | 26–35         | 128       | 42.4         |
|                    | 36–45         | 59        | 19.5         |
|                    | 45 or above   | 14        | 4.6          |
| Employment period  | Under 2 years | 101       | 33.4         |
|                    | 2–5 years     | 80        | 26.5         |
|                    | 6–10 years    | 73        | 24.2         |
|                    | Above 10 years| 48        | 15.9         |
| Occupational position | Supervisor  | 83        | 27.5         |
|                    | Manager       | 95        | 31.5         |
|                    | Junior Manager | 94       | 31.1         |
|                    | Operator      | 30        | 9.9          |

3.2. Statistical analysis:
Using the Pearson correlation coefficient, the association between supply chain management issues and their impact on business performance was assessed. The details are given in following sections.

3.2.1. Reliability:
To measure the reliability of the data, Cronbach’s alpha was utilized. The measurement scales of reliability used in this study varied between .880 and 0.891 (above 0.7) as shown in Table 2 confirming the reliability of this model.

Table 2. Reliability of Research Model

| Factors | Items | Variance | Reliability (α) | Factors | Items | Variance | Reliability (α) |
|---------|-------|----------|-----------------|---------|-------|----------|-----------------|
| HRM     | 3     | 12.250   | 0.891           | CRM     | 5     | 11.810   | 0.875           |
| Tech    | 3     | 11.065   | 0.884           | RI      | 3     | 11.798   | 0.882           |
| Fac     | 2     | 11.212   | 0.886           | Log     | 4     | 11.434   | 0.873           |
| SRM     | 3     | 11.744   | 0.88            |         |       |          |                 |

3.2.2. Validity
Pearson correlation coefficients were used to measure convergent validity. From Table 3, the values of correlation among different factors confirm validity of the model.

Table 3. Convergent Validity among the factors

|         | HRM  | Tech | Fac  | SRM  | CRM  | RI   | Log  | Bus_Perfor |
|---------|------|------|------|------|------|------|------|-----------|
| HRM     | 1    |      |      |      |      |      |      |           |
| Tech    | 0.508|      |      |      |      |      |      |           |
| Fac     | 0.484| 0.547|      |      |      |      |      |           |
| SRM     | 0.459| 0.548| 0.56 |      |      |      |      |           |
| CRM     | 0.515| 0.576| 0.556| 0.633|      |      |      |           |
| RI      | 0.471| 0.505| 0.504| 0.568| 0.697|      |      |           |
| Log     | 0.55 | 0.621| 0.584| 0.637| 0.678| 0.602|      |           |
| Bus_Perfor | -0.423| -0.3 | -0.073| -0.036| -0.059| -0.15 | -0.179| 1         |

3.2.3. Regression Validity
Predictive validity was determined using regression analysis. The Regression coefficient (R) highlights the correlation between predicted and observed business performance. In table 4, it can be seen that the value of R (0.759) reflects that the adopted research model adequately predicts business performance.
Table 4. Summary of Regression test

| Factors | Regression coefficient (B) | Standard Error | Regression coefficient(B) | t-value | Significance level (p) |
|---------|----------------------------|----------------|---------------------------|---------|-----------------------|
| HRM     | -0.116                     | 0.072          | -0.118                    | -1.608  | 0.039                 |
| Tech    | -0.078                     | 0.063          | -0.098                    | -1.227  | 0.021                 |
| Fac     | -0.056                     | 0.063          | -0.069                    | -0.886  | 0.016                 |
| SRM     | 0.2                        | 0.08           | 0.021                     | 0.249   | 0.049                 |
| CRM     | -0.067                     | 0.098          | -0.065                    | -0.684  | 0.029                 |
| RI      | -0.023                     | 0.08           | -0.024                    | -0.286  | 0.006                 |
| Log     | -0.114                     | 0.087          | -0.12                     | -1.305  | 0.004                 |

Beta coefficient represents the relative strength of the factors among themselves. Beta coefficient is statistically significant if its p-value is smaller than 0.05[43]. The third column in Table 5 highlights that all the factors included in this research model are statistically significant.

Table 5. Results of Regression Analysis

| Factors | Regression coefficient (B) | Standard Error | t-value | Significance level (p) |
|---------|----------------------------|----------------|---------|-----------------------|
| HRM     | -0.116                     | 0.072          | -1.608  | 0.039                 |
| Tech    | -0.078                     | 0.063          | -1.227  | 0.021                 |
| Fac     | -0.056                     | 0.063          | -0.886  | 0.016                 |
| SRM     | 0.2                        | 0.08           | 0.249   | 0.049                 |
| CRM     | -0.067                     | 0.098          | -0.684  | 0.029                 |
| RI      | -0.023                     | 0.08           | -0.286  | 0.006                 |
| Log     | -0.114                     | 0.087          | -1.305  | 0.004                 |

4. Results and Discussion

This study highlights research model comprising of seven features including managements of human resources, technology, facility, supplier relationship, customer relationship, regulatory issues and logistics and how these features influence business performance in context of a food processing industry. Results shown in table 3 indicate that human resource management has a negative correlation with the business performance \( (r = -0.423) \) signifying that whenever problems regarding human resources arise, business performance of the firm decreases and vice versa. Table 5 also highlights that while predicting business development performance, human resource management problems are statistically significant \( (\beta = -0.118; p = 0.039) \). The negative value implies that HRM problems lead to reduce business performance which can be advocated with previous studies[44].

Results also suggest that a negative correlation exists between business performance and technology-related problems as shown in table 3. Analysis of the regression model also suggests that technology-related problems were statistically significant in predicting business performance \( (\beta = -0.098, p = 0.021) \) as shown in table 5. These values suggest that the existence of technology-related problems negatively impact business performance in the food processing industry. This finding is consistent with other research study[45].

The facility-related problems also had a weak but negative correlation with the performance of the business \( (r = -0.073) \) indicating that unsuitable facility locations lead to a negative impact upon the performance of the business[46]. Values displayed in table 5 \( (\beta = -0.069; p = 0.016) \) show that these problems were also statistically significant in predicting the performance of the business.

The supplier relationship management problems had a very weak and negative relation with the performance of business \( (\beta = -0.36) \). This suggests that problems associated to supplier relationship management does not significantly influence the business performance. These issues were also statistically significant in predicting business performance as shown in table 5 \( (\beta = 0.021; p = 0.049) \). Table 3 also highlights that a weak negative correlation exists between customer relationship management problems and business performance \( (r = -0.059) \). This reflects that any increase in problems related to customer relationship management, reduces the business performance. However, this reduction will only occur to a certain extent. In this analysis, customer relationship management problems proved to be significant in predicting business performance \( (\beta = -0.065; p = 0.029) \).

It can also be seen that regulatory factors had a negative influence on the performance of the business \( (r = -0.10) \). This suggests that when problems relevant to legal scenarios arise, it will affect the
performance of business but this effect might not be very strong. Regression analysis also reflected that legal issues were also statistically significant in predicting business performance ($\beta = -0.024; p = 0.006$). It can also be seen that transportation issues also had a negative influence on the performance of the business ($r = -0.179$) as seen in table 3.

5. Conclusions
The research aimed to investigate the impact of supply chain management issues on business performance in Pakistan. This research has indicated that it is imperative to understand supply chain management problems and their origins in order to design approaches for avoiding and minimizing their negative effects on business performance. It is also highlighted in literature review of previous studies that although food processing industry is capable of making significant contribution to the economy of a country. Nevertheless, food processing industry in Pakistan faces multiple problems. Results obtained from Pearson correlation analysis exhibited that all of the seven factors exhibited correlation with the business performance indicating that increase in these problems, will reduce the business performance and vice versa. Furthermore, human resource management problems had a strong correlation in comparison to the other six factors. In comparison, supplier relationship management presented a weak correlation with the business performance. Results obtained from regression analysis also reflected that all the factors are found significant to predict business performance.

The results of the study have several implications. It highlights the importance of supply chain management and which directly influences the performance of the business in food processing industries. The overall organizing principle of this study is that business performance in food industry, among other things, can be improved by reducing the severity of supply chain management problems. It is also important to understand that there is currently a shortage of supply chain professionals in Pakistan. To mitigate this human resource management issue, it becomes important that competent supply chain professionals are recruited. Once they are hired, there should be regular trainings to develop their knowledge, skills and output. To solve technological issues, the rapid implementation of disruptive technologies is required. To be competitive in market regular maintenance of key technologies and the integration of technologies across all business functions should be made. ISO standards, sustainability or green supply chain management systems can be implemented to counter the problems associated with facilities management. The problem faced with facility management can be countered by practicing international standards and philosophies like ISO, sustainability and green SCM.

Some limitations are also outlined for this research study so that they can be addressed in the future. Data were collected from a sample size of 302 respondents located in the different regions of the provinces of Khyber Pakhtunkhwa and Punjab only in Pakistan. Future research studies should be focused on collecting data from other provinces of Pakistan based on face to face structured interviews.

6. References
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