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AN EVALUATION OF SUPPLY CHAIN SUSTAINABILITY RISK MANAGEMENT IN PAK SUZUKI MOTOR COMPANY LIMITED

Hamza Arsalan[*1], Dr. Imran Ahmad[2], Abdur Rehman Babar[3], Hamid Khan[4]

[*1]hamza.arsalan_ind@uetpeshawar.edu.pk, [2]imranahmad@uetpeshawar.edu.pk,
[3]abdurrehman@uetpeshawar.edu.pk, [4]hamidkhan@uetpeshawar.edu.pk

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Corresponding Author: *
Hamza Arsalan

Abstract
For any business organization, the standards for managing supply chain risks are critical as they tend to minimize risks and spend money on resources to make sure they are achieve sustainability goals. Organizations face two main types of risks: specific supply chain risks, such as design flaws and logistic problems, and additional risks associated with sustainable supply chains, which include environmental, economic, and social dimensions. Effective risk management systems are essential for companies to mitigate these threats and maintain stable operations, as these risks can negatively impact the physical environment, financial performance, and company reputation. This research study employs an explanatory research design technique to investigate the impact of supply chain management on competitive advantage. A mixed methods approach, combining qualitative and quantitative data, was used to ensure comprehensive analysis. Data collection involved a survey-based strategy, utilizing questionnaires adapted from existing studies. The analysis aimed to provide actionable insights for improving supply chain practices and mitigating risks. The results showed significant and positive association that shows how Suzuki's competitive advantage is positively impacted by the social, economical and environmental supply chain management risk for which the value of P<0.05. This study elaborated a detailed examination of the causal relationships within the supply chain context.

INTRODUCTION

Supply chain is the backbone of any industry to survive in the present economic crises. Many factors including suppliers, distributors, and manufacturing decisions have a found impact on supply chain decision making. Supply chain management is an extensive, complex task that relies on each partner from suppliers to manufacturers and beyond. Because of this, ineffective supply chain management also requires
effective team work and risk management to create alignment and communication between all the entire supply chain. According to prior research studies [1], Asian business owners have been disproportionately affected by severe supply chain disruptions. Despite these challenges, Pakistan has experienced notable growth in automotive production. Within the Pakistani context, supply chain constraints remain a central concern for the automobile sector. Risk management as a concept focuses on removing certain undesired challenges from the supply chain while also enhancing optimal and efficient of supply chain practices to enable efficient operation. The strategies employed for removing risks from an operational supply chain is

of great importance. In companies like Suzuki Motors, the ability to control supply chain risk enables users to avoid obstacles altogether and minimize their timely quality complexity. This begins with pinpointing the risks that may prohibit the user from delivering customized items to consumers on schedule, knowing the extent to which each sort of risk like damaged stock, dynamic high prices etc. can hurt operations, and instructing the business forms to develop quick and effective solutions to resolve problems [2]. It aids in fostering an agile supply chain for improved outcomes. The Suzuki organization's market share can be increased, which would help it beat rivals in addition to all the other benefits.

This research study aims evaluates Suzuki Motors' supply chain risk management. Accordingly, the present research sets out to provide the relevant suggestion related to Supply Chain Management (SCM). The research's goals has been outlined based on evaluation of the supply chain of Pak Suzuki Motor Company (PSMCL), identifying problems in the supply chain of PSMCL and provision of recommendation to PMSCL for improvement of supply chain.

Literature review

Theoretical Background

Development of SCM Risk: During periods of economic uncertainty, organizations may rely on robust risk management practices to sustain operations and potentially capitalize on risk-related opportunities, particularly when competing against firms that possess less advanced risk management capabilities. Each time an ongoing disaster is reported, the visibility of the risk management component drives it to fail and increase. The continual obligations provide aid towards lowering quantity (such as, increase & decrease) via each risk occurrence, especially whenever there is a report of attention being paid to SCM risk management [3].

The notion of SCM developed commercial insight that places the needs of the customer first. This strategic culture encourages improvements in a firm's internal and external relationships and then incorporates the synergy of inter-functional, multi coordination and integration. Several bottom-line advantages might result from the seamless incorporation of complete SC development [3]. Mostly business undertake benefits like Improved customer service and value addition, Increased capital (fixed) cost, Sales profitability.

Recent studies claim that supply chain interruptions resulted in a notable drop in stock returns relative to benchmarks (for example, a drop of 33% to 40% over a three-year period) [3], a boost in volatility in share prices (such as a 13.5% rise a year after supply chain disruptions), a reduction in profit rate (such as, a 107% yearly decline in income, almost 7% annual decline in sales growth, and an 11% annual increase in total costs) and poor company performance (for instance, at least two years in a row of declining performance following procurement disruptions).

An organizations aptitude to attract and retain customers is crucial to its growth. More specifically, the company's sales, profits, competitiveness, and market- share are all directly impacted by customer service. Because it determines inventory quantity that must be kept on hand by company. SCM provide clients with access to a product anytime they want to buy it.

Supply Chain

Every commercial transaction involves at least one supplier and one customer on each end. The term *supply chain* encompasses the set of activities and processes that connect these suppliers and customers. It includes all procedures involved in moving materials from their initial sources to the final end user. Consequently, the supply chain incorporates not only the internal departments of a firm but also external partners such as distributors and other intermediaries.

In the context of management, overall, SCM requires managing the flows of information, goods, and cash via supply chain stages [5]. Having strategic advantage over competitors and optimizing value propositions, SCM involves actively managing and coordinating supply chain activities. The supply chain actors are uniting to generate and oversee their systems in the most effective and efficient manner possible. The essential significance of the integration and coordination of activities among various supply chain partners is discussed by different studies [6]. This network coordination can decrease the amount of inventory on hand, boost

sales through enhancing customer service, and provide many other advantages. Moreover, SCM concentrates also on superior execution of engagements, vendors, storage, and merchants so order to build and allocate appropriate item at the right time, location, and cost.

When inputs are scarce, a brand's ability to maintain itself demonstrates a higher level of dependence on working capital for managing downtime and increasing peak season hours, respectively [7]. The response to electronic- commerce transactions have revealed a higher feature of requests the transfer of consumer products and also the raw materials. This demand in particular was discovered to demonstrate a greater rate than that of anticipated; it encountered a severe lack of available containers as well as a severe lack of shipping capacity. This lack of supply has ultimately caused prices to increase by more than 200% oscillating from Chinese to West- Coast distance [8]. The supply chain managers in the current situation can promote letting go of biasness, pursuing a brand-new set of different forecast models, and continuing the process of refining the consequences for enhancing the accuracy percentage respectively [9].

Father studies showed that the the COVID has caused the threshold for delivery times to be lowered and the necessity for a great consumer experience to be raised. The difficulty calls for the introduction of an agile supply chain system that can harness automation to improve fulfillment and free up space for more easily handling rising demand [10].

Digital transformation and IoT together might be regarded as two separate blessing, when discussing how the supply chain is operated. Many different technologies have been developed that are equally as effective as or perhaps more effective in improving how the conventional type of supply chain is approached. The long-term goals of all the aforementioned technologies are to increase efficiency and cost effectiveness.

Supply chains are growing more vulnerable while also becoming more efficient [11] asserts in his research that neither of businesses he questioned do have experience in evaluating supply chain risks. Notwithstanding fact that a majority of managers are conscious of the presence and relevance of supplier base. Companies are experiencing increasing disruptions as a result of managers' lack of awareness and understanding of the risks and effects of their choices. Even while some hazards cannot be completely eliminated, they can be recognized, evaluated, quantified, and reduced.

Risk-Management prevention, preparedness, response, recovery (PPRR) model regarded as the most widely used SCM model technique, being used at numerous firms globally Numerous companies have been observed to completely alter their business models in order to adjust to the correspondingly severe variations in the viability and seasonality of their products. Fww studies have a employed multisource model. Multi source refers to the various elements that may surround a problem or issue as a whole. Supplier categorization is a useful tool for risk reduction, but it shouldn't just be used to restrict costs; potential effects should also be considered.

Similarity nearshore methodology has also been applied reducing travel time can dramatically lower the risk associated with supply chain management, despite the fact that localized suppliers may be more expensive [12]. Because so many vulnerabilities find their latent forms in the logistics system, regular and thorough stress testing is seen to be the most effective way to find them [13]. Investment in product design and the harmonization of production plants, supported by standardized supply chain management (SCM) practices across components, has been shown to enhance organizational flexibility during periods of disruption. At the same time, many firms are leveraging emerging technologies such as the Internet of Things (IoT) to improve their ability to anticipate, monitor, and mitigate SCM-related risks. The growing significance of supply chain risks underscores the value of effective risk management, which strengthens partnerships within the supply chain by facilitating more transparent, timely, and reliable information exchange[14]. As a result of the supply chain's capacity to be relied upon and the accompanying commitment, there is an increase in trust in risk management procedures.

Risk analysis can assist in focusing supplier practices on the proper suppliers and concerns. However, mainly social risks includes suppliers, labor and diversity challenges related to organization. In their 2019 article, [15] addressed how corporate social

responsibility, such as employee safety, health, and motivation—affects a company's ability to compete.

According to [16], economic risk arises from currency changes, unpredictability in demand and prices, fluctuating labor costs, and inflationary pressures, all of which make it difficult for enterprises to exactly plan their investment in foreign markets. This compels many organizations to select a more condensed and uncomplicated supply chain, claim [16]. If exterior procurement is necessary, corporations must stay in touch with their suppliers commonly to certify they are elastic sufficient to monitor and react to market trends.

SCM of Suzuki

The Procurement and marketing of Suzuki Motors' products is handled via a network of authorized dealers and different locations in the domestic market. Additionally, it includes the networking infrastructure that connects providers & corresponding native brokers on international marketplace. It has been discovered that the business keeps tabs on the effectiveness of the corresponding distributors and dealers [17]. Additionally, it was discovered that the corporation was giving them extra assistance so they could meet the required standards. Any under performance discovered by the dealers or distributors may ultimately have a negative impact on selling and operational metrics of the Suzuki in substantial way. It is discovered that the business depends on the aforementioned third parties to provide the necessary raw resources, components, or equipment used in the creation of the items. Yet, it discovered that the corporation relies on a specific source to obtain component, respectively [18]. Suzuki to get materials that prioritizes cost effectiveness and timeliness is discovered to be dependent on a variety of circumstances, the majority of which are still beyond the company's control [18]. The business is discovered to be actively participating in the vendor management process by managing its own supply chain. Any problems with the supply chain might be deemed to have significant effect on the industry's operational level.

The automotive market is rapidly evolving, particularly in terms of modernization, with Suzuki demonstrating consistency through significant Research and Development efforts. The company focuses strategically on key technological areas like autonomy, electrification, and connectivity to introduce innovative products ahead of competitors, setting high standards for electric vehicles. Suzuki invests in lightweight materials and aerodynamic improvements to enhance efficiency [19].

Investments in technology by Suzuki Motors, such as factory automation and the shift to electronic scales, contribute to market changes and keep the company ahead of competitors [20]. Suzuki actively manages product guarantees and liabilities, tracking service data to proactively manage recalls and warranty claims [21]. The company leverages connectivity and digital capabilities to identify and repair flaws efficiently, aligning with government initiatives and enhancing supply chain risk management.

Effective risk management provides Suzuki Motors with a competitive advantage by allowing it to capture market share and innovate in response to threats. The company's quick identification and mitigation of risks contribute to its strategic positioning [22].

Supply chain management (SCM) plays a vital role in achieving competitive advantage, with factors like resources, capacity, mobility, innovation, and information directly impacting performance. Enhancing SCM performance through active management and collaboration with partners is crucial for competitiveness [23]. In today's dynamic market, superior capabilities drive competitive advantage, enabling companies to create customer value and sustain long-term viability [22].

Porter's framework outlines strategies for advantage, such as cost leadership or differentiation. Companies must continually innovate and invest in areas like cost, quality, reliability, and delivery speed to maintain an edge [24]; [22]. Operationalizing competitive advantage involves measuring aspects like cost, quality, innovation, and delivery speed, as outlined by existing literature [13]. The operationalization of competitive advantage in the literature already in existence [13] served as the basis for the measures used in this study, which only required minor adjustments. According [25], this study uses the following five aspects of competitive competence. These sub-constructs, their descriptions, and any relevant research are listed in Table I.

TABLE I. PRODUCT INNOVATION AND THEIR SUBCONTRACTS

A framework is constructed that outlines the causal links between SCM practices and competitive advantage in order to better understand how SCM practices affect competitive advantage as shown in the Figure 1.

	Construct Definitions
Product Innovation	"An organization's capacity to deliver new features and goods to the marketplace"
Delivery Dependability	"The capacity of a company to deliver on time the kind and quantity of goods that customers demand"
Price/Cost	"An organization's capacity to compete against significant rivals on the basis of low cost or price"
Time to Market	"The capacity of a corporation to launch new items more quickly than key competitors"
Quality	"An organization's capacity to provide goods and services of a calibre and performance that enhance customer value"

Following justification underpins the study structure. However, a company's SCM procedures will impact its competitive advantage and affect the economic, environmental, and social SCM risks of firms.

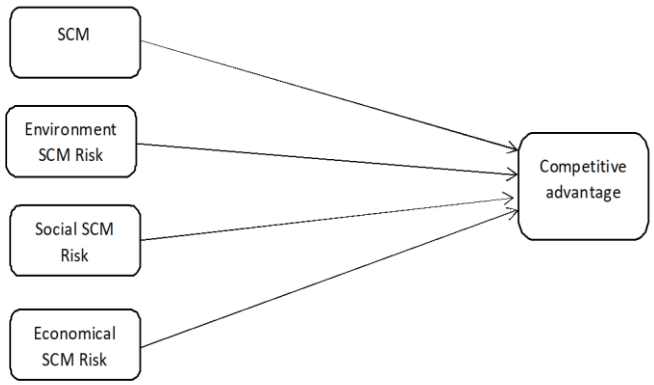

Fig. 1. **Theoretical Model**

A company's supply chain management (SCM) procedures are a set of actions it takes to ensure efficient supply chain management [26]. SCM methods have been listed in a variety of ways by different academics. Among them are JIT capability, information exchange, integration of supply chains and management of customer service. Others traits includes purchasing, quality, and customer relations [27]. Cooperation, process integration, longterm relationships, shared procurement leadership, a strategy and goals declaration, knowledge transfer, responsibility and reward sharing, are all

mentioned. [26] used previous research to concept five unique features of SCM procedures that cover the striking facets of supply chain. In addition to postponement, these practices also involve customer associations, excellence of evidence sharing, and strategic supplier partnerships. Through factors including premium, quality, supplier reliability, speed to market, and technology innovation, SCM procedures have an impact on an organization's competitive advantage and effectiveness. Accordantly, SCM techniques like strategic supplier partnerships can refine supplier performance and reducing time, may strengthen SCM competitive edge. [26]. Additionally, activities like information exchange and high-quality information have been seen to favorable influence the consumer consummation[1]. However, increasing SCM flexibility, postponement method also strikes a balance between global efficiency and client responsiveness. Deep links across supply chain strategies and competitive strength was further proven different studies [1]. Finally, emphasized impact of SCM techniques on various aspects of competitive advantage, including buyer and supplier interactions, information exchange, and customer relationship [13]. As a result, it is suggested that;

- SCM practices positively affect Suzuki' competitive advantage.
- Environment SCM risk positively affect Suzuki' competitive advantage.
- Social SCM risk positively affects Suzuki' competitive advantage.
- Economical SCM risk positively affects Suzuki' competitive advantage.

This study contributes towards a theoretical standpoint of the relations seen between variables effecting SCM. This study advances contemporary knowledge on supply chain concepts and their underlying structures, incorporating the latest theoretical and practical developments. It employs a personally administered quantitative data collection approach, enhancing the precision and reliability of the findings. The work further contributes to empirical research in supply chain management by critically reviewing the results and offering novel insights. In addition, the study proposes updated policies and procedures for Suzuki to strengthen its supply chain strategies. Finally, it provides a significant contribution within a non-western cultural context, extending the applicability of SCM research beyond traditionally studied regions.

Research Methodology

This section summaries technique & procedures that were employed to address study questions and further test propositions that were utilized. Furthermore, the clarification of technique or methodologies, research design, strategy, sample, instrumentation, and instruments for data analysis is outlined.

Research Design Process

In an explanatory research design, the researcher's primary goal is to create hypotheses based on several ideas that try to explain how a particular phenomenon functions [28]. Examining the effect of supply chain of Suzuki on competitive advantages which totally deals with organizational excellence is the main goal and the subject under examination in this research. As a result, the explanatory research design is deemed appropriate for application in this study.

Research Approach

The objective of the current study is the usage of a measurable variable to efficiently quantify experimental concepts. Similar to this, [29] few studies stressed the importance of using a quantitative approach to investigate hypotheses while taking into account cause/effect connection, make predictions nearly forthcoming conclusions. Few studies[30] further argued that the quantitative research method can be used to both quantify and gauge the level of participants' attitudes. This research methodology has already been employed in some literature-based research studies on supply chain management and risk minimization.

Research Strategy

A researcher's plan essentially consists of a research strategy that must be chosen before beginning the research project [31]. A few different research methodologies have been recognized in the literature, including experimental studies, survey-based studies, case studies, grounded theories, action research, etc. [29]. Survey-based strategies have been operated by industrial researchers to get data from respondents [26]. Furthermore, it was asserted by [28] that this method is frequently employed to look at traits of a particular community, such as its attitudes and behaviors. Additionally, some academics claim that it is advantageous because it collects a variety of data from the populace [3]. In light of the foregoing reasoning, this study employed a survey-based approach, and questionnaires were modified from other studies to obtain the replies.

In contrast, research is typically conducted in a cross-sectional time frame when it relates to a specific event occurring at a given period. It is the most acceptable technique to get the necessary data collected once from the responders [3], As a result, the present study takes place throughout a cross-sectional time period and primary data is acquired from staff at 165 Suzuki motors (Pakistan).

In essence, the populace describes entire data-set via the selected illustration is chosen for analysis based on specific sampling methodologies. The samples used in sampling must accurately represent the overall population [3]. The two primary strategies—probability and non-probability—for choosing the sample from the target population have been established by experts in the literature. Probability sampling is very important for the goal of generalizability since all components of populace get equivalent chance [29]. Additionally, the ideal strategy is probability sampling when dealing with a known population [30]. The population of this study was individual working in Suzuki Pakistan. "Normally, multi-stage sampling is utilized in massive inquires extending to a relatively vast geographical area, say, the entire country," according to [29]. In addition, he claimed that "since the sample frame in multi-stage sampling is broken into partial units, it is easier to administer than single stage designs." Multi-stage sampling is therefore thought to be the most appropriate method for this study, taking into accounts the aims and population. Consequently, stratified sampling is used in the first step since it provides a detailed description of each group [28]. The demographic sets in different groups then divided up several "strata" in stratified sampling. However, stratum is handled and individuals could be selected at random and who all have an equal probability of being chosen as a "element." Additionally, according to [28], "with stratified sampling, the population is separated into many sub-populations that are individually more homogeneous than the whole population, which are called "strata," and then items are selected from each stratum to produce a sample."

Different studies recommended different factors to be taken into consideration while determining the sample size. Roscoe offered the following general guidelines: If minimum number of participants of 30 is expected for every category. The sample is broken into subsamples or subgroups. The sample would generally be larger than 30 and fewer than 500 in most studies. In multivariate studies, the sampling size should be at least ten times greater than the total number of observed variables. Item to answer ratios for the appropriate sample size for each scale set though, should fall between 1:4 and 1:10. However, asserted that sample size is crucial to determining the sample for the generalizability of the outcomes. Additionally, Roscoe formula chooses for an acceptable sample size, boost the study's reliability, and increase the suggestions' generalizability. So, Roscoe recommendation utilized in current scenario. In the environmental SCM Risk Management: It is considered the second independent factor, and a 4-item scale. Likert 4 degree of scale (such as, no risk, minimum risk, mild risk & high risk) was utilized to measure SCM environmental risks. For example, "Demand projections in terms of demand price for our primary products are typically inaccurate." For example, "Demand projections in terms of demand price for our primary products are typically inaccurate."

The reliability of this questionnaire was .90.

It considers the 3 independent factors and a 7-item scale established by [32]. Likert 4 degree of scale (such as, no risk, minimum risk, mild risk & high risk) was utilized to measure SCM social risks. Sample comprises "Our company conducts social audits at suppliers or employs a third party for such audits" The reliability of this variable is .90.

Economical SCM risk management: It considers the fourth independent factor, and a 4-item scale recognized by [33]. Likert 4 degree of scale (such as, no risk, minimum risk, mild risk & high risk) was utilized to measure SCM economical risks. For example "My supervisor decreases in the cost of production." The reliability of this variable is .90.

Competitive advantage: It is the dependent variable and was measured by 8 items scale developed by Appendix 1. Sample comprises "My supervisor ridicules me"; "Our firm is electronically interconnected with some suppliers." The reliability of this variable is .90.

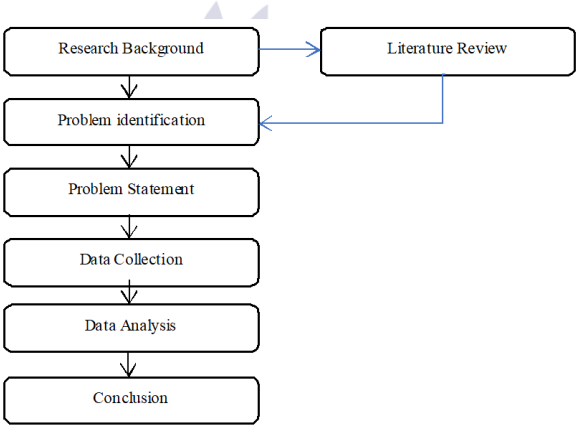

Fig. 2. **Flow Chart of Adopted Methodology**

Data Collection Procedures

Data collection is carried out using self-administered questionnaires to gather responses from the participants. According to some academics, a questionnaire is particularly helpful when it comes to gathering information regarding, among other things, attitudes, emotions, sentiments, ideas, objectives, personalities, habits, and ideals [29].

[29] also highlighted the fact believe gathering data via series of questions surveys is more affordable, quicker, and an effective technique to assess information about the target, audience, and an accurate way to do so. Additionally, some other academics agreed with them and believed that survey based questionnaires were the ideal instrument for gathering data [30].

For this study, primary data were collected through a structured, survey-based questionnaire distributed to employees of Pak Suzuki Motor Company across multiple branches in Pakistan . Validated Likert-scale instruments adapted from prior studies captured measures of supply chain practices, environmental, social, and economic risks, and competitive

advantage. Using multi-stage and stratified sampling, 200 questionnaires were disseminated and 169 valid responses were obtained, yielding an 84.5 percent response rate. Participants were assured confidentiality through a cover note explaining the study purpose and anonymity. The completed questionnaires served as the core dataset for subsequent statistical analysis.

The secrecy of defendants kept retained in order to reduce any potential biases, but it was made plain at the end of the questionnaire that this was only the case if the respondents were interested in knowing the results.

SPSS (version 20.0) software was utilized to scrutinize data that was composed. Data- analysis included running tests for correlation, regression and other significant measures. To inspect link between independent/dependent variables, correlation- analysis was utilized. The dependence between the variables was investigated using regression analysis. To examine the relationship between various factors, the Baron and Kenny (1986) technique was applied.

The demographics variables for the survey included age, gender, designation, qualification, and experience.

DATA ANALYSIS

This section comprises of analysis of data collected through questionnaire to test the proposed research hypothesis. Furthermore, to investigate association among all theoretical variables descriptive statistics and Pearson correlation were utilized.

Demographical Analysis:

Gender: In the quantitative-survey, the first question about respondents' gender is asked. In total, 165 people take part in this research. While just 21.2% of the 35 female respondents in this poll were female, display low percentage of female respondents in Suzuki. It is vital to illustrate how women feel about supply chain management and any potential causes or impressions.

TABLE II. GENDER DATA STATISTICS

Characteristics	N	%	Valid %	Cumulative %
Female	35	21.	21.	21
Male	130	79.	79.	100.

Age: The demographics analysis provided in this quantitative study's second characteristic is age. The quantitative variables' age demographics revealed among the majority of people surveyed spanned in age around 28 - 38, or 45. 5% of the total population. As a result, it is noted that the majority of respondents were from the younger generation, who had easy access to social media. The second-highest proportion, or 33.3% of the population, was found among workers aged 39 and older. The third and final age group, which comprises 21.2% of the overall population, was drawn from the workforce aged 17 to 27. The last age group's reaction is crucial because it is the youngest class to have ever entered
the Suzuki business.

TABLE III. AGE DATA STATISTICS

Characteristics	N	%	Valid %	Cumulative %

17-27	35	21.2	21.2	21.2
28-38	75	45.5	45.5	66.7
39 and <	55	33.3	33.3	100

Job Experience:
The third aspect of the demographic analysis reported in this quantitative study is job experience. Table III demonstrates how the participants' levels of work experience at the Suzuki Company differ. The majority of respondents (77) working for Suzuki, or 46.67% of the total population, had expertise in the software business. In addition, 33.33% of respondents had experience ranging from 5 to 9 years. Another significant group was, which included workers with more than ten years of experience and made up 20% of the population overall. This segment's response was also highly significant because it demonstrates that Suzuki employs a variety of individuals with a range of backgrounds.

TABLE IV. JOB EXPERIENCE

Characteristics	N	%	Valid %	Cumulative %
1- 4	77	46.7	46.7	46.7
5- 9	55	33.3	33.3	80
10 and <	33	20	20	100.0

Qualification:The fourth category of the demographic analysis displayed in this quantitative study is qualification. Table III demonstrates that only 25 of the respondents had a secondary school diploma (Matric), which is the equivalent of ten years of study. The second section, comprising 39 people overall and 23.6% of the population is intermediate qualification. Graduates make up the third sector, which comprises 55 people overall and accounts for 33.3%. There are 46 people that have master's degrees, or above 27.9%.

TABLE V. QUALIFICATION

Characteristics	N	%	Valid%	Cumulative %
Matric	25	15.	15.	15.
Intermediate	39	23.6	23.6	38.8
Graduate	55	33.3	33.3	72.1
Masters, above	46	27.9	27.9	100

Job Designation: The fifth and last component of the demographic analysis reported in this quantitative study is job designation. The post designations in the Suzuki sector are roughly categorised into three categories in this quantitative study: team members, supervisors, and managers. The majority of responders in the Suzuki Industry are team members, who primarily belong to the working class. According to the table, 50.9% of the population in the Suzuki Industry is made up of team members. The remaining 21.8% of responses were managers, making up 27.3% of the authorized officers. The table below illustrates how various occupational segments are employed at Suzuki industry.

TABLE VI. DESIGNATION

Characteristics	N	%	Valid %	Cumulative %
Team member	84	50.9	50.9	50.9
Supervisor	45	27.3	27.3	78.2
Manager	36	21.8	21.8	100
Total	165	100.0	100.0	

Descriptive Analysis

To better comprehend and know the attitude of the employees toward variables, a descriptive analysis of the data is conducted. Means, standard deviations, skewness, and kurtosis are all components of descriptive analysis, which allows for a meaningful summary of the data presented in Table VI. The summary of the data is provided by mean and standard deviation. The average of all the questions reveals a high level of overall respondents' confidence in the claims made to gauge the study's variables. The standard deviation measures the variability that is represented by the score distribution. Measures of the data's shape that reveal an indication of its normality include skewness and kurtosis [29].

TABLE VII. DESCRIPTIVE STATISTICS

		Mean	S.D	Skewness	Kurtosis
Supply chain mgt.	165	3.01	.97	.21	.04
Environmental supply risk mgt.	165	3.04	.87	.34	-.06
Social supply risk mgt.	165	3.2	.78	.42	-.09
Economical supply risk mgt.	165	3.42	.65	.22	-.24
Competitive-advantage	165	3.52	.57	.31	-.69

According to descriptive research, the notion associated with supply chain management has a high mean value. Suzuki and supply chain management are significantly related, as evidenced by the average score across all build components being higher than 3. The linked items' standard deviation is greater than 1, compared to the supply chain management standard deviation of 0.97. This indicates the wide range of replies to the questions analyzing supply chain management and related components. Additionally, each item's standard deviation is less than 1, which

indicates a significant range of responses to the related issues. According to the descriptive study on competitive advantages, which shows a mean value over 3, improvements in supply chain management are cited as a factor in Suzuki's competitive advantages.

One of the key instruments for ensuring data symmetry is correlation analysis. To identify the correlation between research variables, a correlation test was used. Coefficient values are estimates of the extent toward which two parameters are linear. The value of the coefficients vary between (such as +1 and '-1'). Table below provides correlation' data for all theoretical variables.

TABLE VIII. CORRELATION

	SC	ESC	SSC	ESSC	CA
SC	1				
ESC	.918**	1			
SSC	.871**	.971**	1		
ESSC	.799**	.917**	.966**	1	
CA	.618**	.750**	.822**	.926**	1

According to the correlation table shown above, it has been assumed that SCM, environmental/social/economical Supply risk mgt. and competitive advantage's level is significant correlated. Environmental, social, and economic supply risk management have positive and substantial correlations with supply chain management (r= =0.618, p0.01), (r= =.918, p<0.01), (r=.871, significant), and (r=.799, significant). Additionally, the substantial positive link among environmental SCM and competitive advantage (r= =0.750, significant). Also, a positively noteworthy association competitive advantage has been discovered by social SCM (r=0.822, p<0.01). Additionally, the strong and positively correlation among economical supply-risk management and competitive advantage (r=0.926, p<0.05).

Reliability Analysis

In this initial phase, all elements that prevented the scales from achieving an appropriate level of reliability were taken out. Using the primary construct's Cronbach's alpha as a reference, the reliability analysis was performed, as shown in (Table 4). Findings indicate five constructs' (cronbach's measure are greater than 0.70.

TABLE IX. CRONBACH'S ALPHA

SC	**.938**
ESC	.938
SSC	.939
ESSC	.940
CA	.941

The reliability results presented in Table VIII show that all constructs used in the study demonstrate excellent internal consistency, as indicated by Cronbach's alpha values well above the recommended threshold of 0.70. Supply Chain Management (SC), Environmental Supply Chain Risk (ESC), Social Supply Chain Risk (SSC), Economic Supply Chain Risk (ESSC), and Competitive Advantage (CA) all exhibit alpha values ranging from 0.938 to 0.941, confirming that the items within each scale reliably measure the same underlying construct. These high values align with the earlier methodological description, where validated multi-item Likert scales were adapted from

established studies and tested for internal coherence. The consistently strong reliability coefficients therefore support the robustness of the measurement instruments and ensure that subsequent correlation and regression analyses are based on dependable and stable data

TABLE X. REGRESSION ANALYSIS (SCM)

TABLE XI.

R	R Square	Adjusted R Square	Std. Error
.618	.382	.378	.44705

The ANOVA results show that Supply Chain Management (SCM) significantly predicts Competitive Advantage. The regression sum of squares (20.105) indicates the variation explained by SCM, while the residual sum (32.576) reflects unexplained variation. With an F-value of **100.60** and a significance level of **p = .000**, the model is statistically significant, confirming that SCM has a meaningful and reliable impact on competitive advantage.

TABLE XII. TABLE OF ANOVA (SCM)

Model	Sum.of. Squares	d.f	Mean- Square	F	Sig.
(Regression)	20.105	1	20.105	100.60	.000
(Residual)	32.576	163	.200		
	52.682	164			

Furthermore, regression analysis was employed to check the trends. There was a causal link between Environment SCM risk and competitive advantages, as demonstrated in table XI. Assuming that 55.9% of the variation in competitive advantages, the modified R Square is .559, or 55.9%. Although there may be other aspects that contribute to the variable of competitive advantages, environment SCM risk strategy accounts for about 44.1% of it. This suggests that those aspects of environment SCM risk Strategy are unable to account for the remaining 84.3% of the variation in competitive advantages. The relative contribution of SCM Strategy is implied by the R2 value of .562 (56.2%), whereas other factors are responsible for the remaining 43.8% of the changes in the change.

TABLE XIII. REGRESSION ANALYSIS (ENVIRONMENTAL SCM)

R	R Square	Adjusted R Square	Std. Error
.750a	.562	.559	.37631

When ANOVA was conducted for environmental variables, results showed significant and positive relationship among environment SCM risk & Suzuki' competitive- advantages a significant F values =209.02, $p<0.05$. Therefore, is significant and positive association that shows how Suzuki's competitive advantage is positively impacted by environmental SCM risk ($p<0.05$). We therefore accept this idea.

TABLE XIV. TABLE OF ANOVA (ENVIRONMENTAL SCM)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	29.599	1	29.599	209.02	.000b
Residual	23.082	163	.142		

Total	52.682	164

The table XIII, shows coefficient, β value for environment SCM risk is 0.750 that indicates that one unit increase in environment SCM risk is increase 75 % in the competitive advantages of Suzuki and it also shows in the significance relationship. It can be generalized that overall results indicates that environment SCM risk is positive and significant relationship with competitive advantage. Moreover, T statistics is also shows the significant relationship (t>2).

TABLE XV. COEFFICIENTS (ENVIRONMENTAL SCM)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.039	.106		19.187	.000
	ESC	.486	.034	.750	14.458	.000

There is a causal link between Social SCM risk and competitive advantages, as demonstrated in the table below. Assuming that 67.6% of the variation in competitive advantages, the modified R Square is .676, or 67.6%.

Although there may be other aspects that contribute to the variable of competitive advantages, Social SCM risk strategy accounts for about 32.4% of it. This suggests that those aspects of Social SCM risk Strategy are unable to account for the remaining 32.4% of the variation in competitive advantages. The relative contribution of Social SCM risk Strategy is implied by the R2 value of .822 (82.2%), whereas other factors are responsible for the remaining 17.8% of the changes in the change.

TABLE XVI. REGRESSION ANALYSIS (SOCIAL SCM

TABLE XVII.)

R	R Square	Adjusted R Square	Std. Error
.822a	.676	.674	.32365

The ANOVA in table XV results showed significant and positive relationship among Social SCM risk & Suzuki' competitive- advantages a significant F values =339.92, p<0.05. Therefore is significant and positive association that shows how Suzuki's competitive advantage is positively impacted by Social SCM risk (p<0.05). We therefore accept this idea.

TABLE XVIII. TABLE OF ANOVA (SOCIAL SCM)

	Sum.of. Squares	d.f	Mean. Square	F	
(Regression)	35.607	1	35.607	339.92	.000
(Residual)	17.074	163	.105		
	52.682	164			

From the below table, it shows coefficient β value for Social SCM risk is 0.822 that indicates that one unit increase in Social SCM risk is increase 82.2 % in the competitive advantages of Suzuki and it also shows in

the significance relationship. It can be generalized that overall results indicates that Social SCM risk is positive and significant relationship with competitive advantage. Moreover, T statistics is also shows the significant relationship (t>2).

TABLE XIX. C

TABLE XX. OEFFICIENTS TABLE (SOCIAL SCM)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	.761	.090		8.488	.000
	ESSC	.806	.026	.926	31.253	.000

There is a causal link between Economical SCM risk and competitive advantages, as demonstrated in table 4.14. Assuming that 85.7% of the variation in competitive advantages, the modified R Square is .857, or 85.7%. Although there may be other aspects that contribute to the variable of competitive advantages, Economical SCM risk strategy accounts for about 14.3% of it. This suggests that those aspects of Economical SCM risk Strategy are unable to account for the remaining 14.3% of the variation in competitive advantages. The relative contribution of SCM Strategy is implied by the R2 value of .926 (92.6%), whereas other factors are responsible for the remaining 17.4% of the changes in the change.

TABLE XXI. REGRESSION ANALYSIS (ECONOMICAL SCM)

R	R Square	Adjusted R Square	Std. Error
.926a	.857	.856	.21499

a. Predictors: (Constant), ESSC

The ANOVA results showed significant and positive relationship among Economical SCM risk & Suzuki' competitive- advantages a significant F values =976.76, p<0.05. Therefore, is significant and positive association that shows how Suzuki's competitive advantage is positively impacted by Economical SCM risk (p<0.05). We therefore accept this idea.

TABLE XXII. TABLE OF ANOVA (ECONOMICAL SCM)

	Sum- of Square	df	Mean Square	F	Sig.
Regression	45.147	1	45.147	976.76	.000b
Residual	7.534	163	.046		
Total	52.682	164			

Results and discussions.

This section presents the empirical findings derived from the 169 valid survey responses obtained from employees of Pak Suzuki Motor Company. The analysis sought to examine the influence of supply chain management (SCM) practices and sustainability-related risk dimensions—environmental (ESC), social (SSC), and economic (ESSC)—on the competitive advantage (CA) of the organization. Using SPSS, a series of descriptive, reliability, correlation, and regression analyses were performed to validate the measurement model and test the proposed hypotheses.

Reliability testing using Cronbach's alpha confirmed excellent internal consistency across all five constructs. SCM, ESC, SSC, ESSC, and CA displayed alpha values ranging from 0.938 to 0.941, exceeding the 0.70 benchmark recommended by Nunnally, indicating that the multi-item scales reliably captured the intended constructs. This high reliability validates the robustness of the measurement model and supports the subsequent inferential analyses.

Descriptive findings revealed consistently high mean values across all key variables, indicating that employees perceive Suzuki's SCM practices and risk management capabilities positively. Competitive Advantage showed the highest mean (3.52), suggesting that employees believe the company gains substantial strategic benefits from its supply chain operations. Standard deviation values remained below 1.0 for all constructs, demonstrating low variability and consistent response patterns among participants.

Pearson correlation analysis revealed significant and positive associations among all constructs. SCM strongly correlated with CA ($r = 0.618$, $p < 0.01$), confirming that stronger SCM practices are linked with enhanced competitiveness. Even stronger correlations were observed between competitive advantage and the three risk dimensions—environmental ($r = 0.750$), social ($r = 0.822$), and economic risks ($r = 0.926$). These results indicate that effective risk mitigation within the supply chain meaningfully enhances the firm's ability to compete.

SCM → Competitive Advantage

Regression analysis revealed that SCM significantly predicts competitive advantage ($\beta = 0.361$, $p < 0.001$). SCM explained 38.2% of the variance in CA ($R^2 = 0.382$), supported by a significant F-statistic ($F = 100.60$, $p = .000$). These findings affirm Hypothesis 1, indicating that integrated SCM practices directly contribute to strengthening Suzuki's competitive position.

Environmental risk management demonstrated a strong positive effect on CA ($\beta = 0.486$, $p < 0.001$), explaining 56.2% of its variance. The ANOVA results ($F = 209.02$, $p = .000$) confirm the statistical significance of this relationship, validating Hypothesis 2. This suggests that proactive environmental practices—such as eco-compliance, ISO certifications, and sustainable procurement—substantially improve competitiveness.

Social risk management exhibited an even stronger influence, explaining 67.6% of the variance in CA ($\beta = 0.598$, $p < 0.001$). The significant ANOVA value ($F = 339.92$, $p = .000$) supports Hypothesis 3. Suzuki's efforts toward labor welfare, supplier audits, and responsible sourcing appear to enhance trust, stakeholder relationships, and overall performance.

Economic risk management emerged as the most dominant predictor, explaining 85.7% of the variance in CA ($\beta = 0.806$, $p < 0.001$). The extremely high F-statistic (976.76, $p = .000$) confirms Hypothesis 4. These results highlight the critical importance of cost efficiency, productivity, resource optimization, and financial resilience in sustaining competitive advantage.

The results collectively demonstrate that sustainable supply chain risk management is a key driver of competitive advantage in the automotive sector. While SCM practices lay the foundation for operational efficiency and integration, it is the effective management of environmental, social, and economic risks that most powerfully enhances strategic performance.

The exceptionally strong influence of economic risk management underscores the cost-sensitive nature of the automotive industry in Pakistan, where fluctuations in currency, labor costs, and supply disruptions can directly affect profitability. Social risk management also plays a substantial role, reflecting the growing importance of ethical sourcing, worker welfare, and regulatory compliance. Environmental risk, though slightly less influential than social and economic risks, still contributes significantly to competitive advantage, signaling the rising importance of sustainability-related practices in modern supply chains.

These findings align with global literature, reinforcing the argument that firms with strong, integrated risk management systems are more resilient, adaptive, and competitive. For Suzuki, strengthening risk mitigation capabilities not only improves operational continuity but also builds brand reputation and customer trust, ultimately reinforcing long-term strategic success.

Conclusions

The analysis demonstrates that Pak Suzuki Motor Company maintains a strong and effective supply chain management system that significantly contributes to its competitive advantage. All four dimensions environmental, social, and economic supply chain risks, along with overall SCM practices showed strong positive and statistically significant relationships with competitive advantage. Regression results confirm that economic risk management has the highest impact, followed by social and environmental risks, while SCM practices also play a substantial role. Reliability tests indicated excellent internal consistency across all measurement scales, and descriptive results showed that employees generally perceive SCM processes as well-developed. Overall, the findings suggest that proactive risk management and integrated SCM practices are essential drivers of Suzuki's operational performance, strategic competitiveness, and organizational resilience.

Limitations

While this research contributes valuable insights to supply chain risk management, several limitations should be acknowledged. The study relies solely on self-reported data, which may introduce respondent bias despite efforts to ensure accuracy. Data were also collected from only one organization—Pak Suzuki—representing a single node within a larger supply chain network; insights from suppliers, dealers, and customers could not be included due to time constraints. Additionally, the study focused only on the direct effects of environmental, social, and economic risk management on competitive advantage, without considering other operational issues such as delayed payments or transportation-related disruptions.

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Appendix 1

Sypply Chain Management (Gawankar et al., 2013)

We share our business units' proprietary information with suppliers.

We frequently determine future expectations.

We consider quality as our number one criterion in selecting suppliers.
We inform suppliers in advance of changing needs.
We strive to establish long-term relationship with our suppliers.
Information exchange between our suppliers and us is accurate.
Our firm has continuous quality improvement program.
Environmental supply risk Scale (Sun et al., 2009)
EMSs are in place in our organization in terms of ISO 14001 certification or any comparable EMS.
We provide design specification to suppliers that include environmental compliance for purchased item.
We help suppliers set up environmental management system /get ISO (14001) certification.
We address environmental concerns of our customers in terms of eco-friendly design/distribution of products.
Social supply risk (Freise, & Seuring, 2015)
A senior manager is responsible for managing social risks.
Our company plays an active role in social interest groups/ NGOs.
A code of conduct or similar standard such as SA 8000 is implemented and has to be obeyed for all business activities.
Our company conducts social audits at suppliers or employs a third party for such audits.
Our company offers incentives for suppliers if they engage in social responsible conduct.
Our company cooperates with business partners beyond the first tier towards improving social (working) conditions along the supply chain
Our company has policies in place for taking action if social misconduct (at suppliers) is documented
Economical supply risk (Das, 2017)
Improvement in the quality of products and services.
Improvement in the overall productivity/capacity utilization of our organization.
Improvement in the competitive advantage of our firm in terms of providing differentiated products to its customers.
Increased opportunity cost for our firm to target and capture new customers
Competitive-advantage (Li et al., 2006).
We deliver product to market quickly.
We are first in the market in introducing new products.
We have time-to-market lower than industry verge.
We have fast product development.
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