

Demand Conditions According to Porter's Diamond and Competitive Advantage of Automotive Firms in Pakistan

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Abstract—The purpose of this study was to investigate theoretical and practical implications of Porter's diamond demand conditions attribute improving the performance of firms in the automotive industry of Pakistan. Empirical based, positivism philosophy governs the study; pilot study was the integral part which entailed finalizing the self-administered questionnaire through which instrument reliability and validity established. Research methodology included various facets of empirical research. Data analysis and findings drawn by applying statistics, both descriptive and inferential. Justified by study findings safe conclusions drawn that Porter's diamond demand conditions do have the strength to provide positive impact on the performance of firms operating in the auto industry. Through this study industry players arguably gain insight on diamond conditions context and improve the performance of firm. This is the first time such study was conducted in Pakistan. Demand conditions determinant study made contribution to theory and supported that Porter's diamond demand conditions are viable component to be applied on industry like automotive. Practical implications include improving the performance of firms by effective use of demand conditions determinant by the practicing managers. Government can understand the concept of demand conditions and its positive implication for the industry. The diamond theory demand conditions attribute is tested for the first time in automotive industry of Pakistan. The study results are specific to the auto industry of Pakistan. Generalizability of results in other industries may be tested with further future research.

Index Terms—Demand Conditions Determinant; Pakistani Auto Industry; Performance; National Competitive Advantage; Porter Model

1. INTRODUCTION

For researchers, competitiveness of firms, industries and nations is a captivating subject and a significantly absorbing study area. Harvard University professor [1] undertook a mammoth study covering hundred industries representing various sectors in ten different countries of the world and sought answer to a critical question, how the United States (US) realized and sustained competitive advantage (CA) internationally? After profound investigation and deep analysis

Porter drew conclusive inferences that success of countries whilst competing globally hinges upon four key determinants provided in diamond framework model, namely, factor conditions component, demand conditions component, related & supporting industries, and firm strategy, structure & rivalry [2].

The four diamond attributes linked with national competitive advantage (NCA) shape the competitive environment for industries. Porter's diamond model presents a framework to carry out industry specific analysis to determine firm's performance and competitiveness while operating in the country. Studies focused on the Porter's diamond framework, including the theoretical aspect, managerial implications and its relevance for policy making institutions. The diamond model determinants linked with national competitive advantage (NCA) provide the impetus for competitive environment (CE) for industries. This model has the potential to be applied in both transition economies, and market based [3]. Besides Porter's national competitive advantage theory, there are other theories of CA advanced by various eminent authors. Some scholars in the field of strategy came up with three main sources of competitive advantage [4] i.e. the industry structure view [5] attributes firm's good performance to strong structural elements. It is an ongoing debate amongst scholars how to achieve competitive advantage and improve firm's performance; researchers advance various arguments and theories which support certain arguments and refute others.

The researchers attempted through empirical research to explore whether Porter's diamond model demand conditions have a determining influence on firm's performance in the key industry like automotives in a developing economy like Pakistan. Positive and significant implications of Porter diamond inclusive of its demand conditions determinant have been evident on the performance of various industries documented in many studies conducted in different countries of the world. Scholars [6] argued contextually and found out increase in the economic competitiveness and performance as a result of Porter's diamond model. However, it remained to be investigated objectively and analyzed whether similar studies with significant and conclusive results could be replicated in the context of Pakistan which is an important developing economy in Asia. In Pakistan, studies on the influence of [1] diamond model demand conditions on the performance of the automotive industry are non-existent or inconclusive. The recommendations as well as the knowledge gaps identified in other studies in the areas of theory, practice, and government policy motivated the researchers to conduct a study which

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would contribute to the constituencies of academia, corporate practitioners, and policy making institutions in the government to assess the influence of Porter's diamond demand conditions determinant on performance of Pakistan automotive industry.

A. Research Question

Empirical research conducted by the researchers on Pakistan automotive industry was steered by the research objective; to determine the influence of demand conditions as a determinant of firm's performance to test the null hypothesis, H_{01} : Porter's diamond demand conditions determinant does not influence firm's performance in the automotive industry of Pakistan.

II. LITERATURE REVIEW

A. Theoretical perspective

This study is guided by Porter diamond model theory's determinant of demand conditions. Porter in 1990 published his seminal text which marked the start of debate on competitive advantage in national and global perspective that has stood the test of time [7]. Porter's book titled *Competitive Advantage of Nations* represented a six-year long study which involved a group of researchers to undertake research studies in ten different states of the world; this massive activity generated prodigious primary data; results were based on analysis of the data [8].

The proponent of diamond theory based his argument on the premise that in the contemporary world economy, national growth and prosperity is created, not inherited. Porter argued that growth and prosperity is choice of the state [9]. Major research on the theory and its practical implications was done in various sectors in other countries of the world. To measure firm's performance from broader contextual aspects (financial, customer, process, and learning & growth) balance scorecard (BSC) tool was used in this study. Kaplan and Norton came up with this tool with the objective to provide fast and at the same time detailed picture of firm sought by the business managers with the logic that it will serve as the first step in improving the managerial performance [10]. There was criticism on the performance measurement (PM) system traditionally available for having focus exclusively on financial parameters and for being deficient to determine and monitor multi-faceted performance the authors argued [11]. Nonetheless the tool has positive connotation. Disregard of the fact it attracted criticism.

B. Empirical literature Review

Automobile manufacturers' competition ways have transformed during the last three decades worldwide [4]. For the very survival, progressive manufacturers of automobile have strategically enhanced globalized production and increased their operations' scale in size. The surviving automotive firms have made capital intensive investment in international arena, with special thrust on the emerging

economies and markets. The changing pattern of doing business which entailed division of labor created new opportunities for automotive components suppliers and automotive manufacturers.

This phenomenon brought about a hike in strategic mergers and acquisitions (M&A) and subsequently influenced reduction in components' suppliers; the resultant implication being increase in their size. Rugraff underscored that emerging worldwide landscape is influencing M&A actions across the regions in the automotive industry. Scholars [12] observed objectively that the automotive industry of China witnessed positive transformational changes during the past few decades and key determinant attribute among others is GDP growth of China. The report [13] shed light on auto industry's competitive position in the context of Africa. The report published that 42.5 million vehicles were operating and registered in Africa in the year 2014. The import was worth US\$48 billion against export of US\$11 billion in vehicles segment, indicative of the fact that in Africa, a continent having around one billion population, the import of automobiles was four times higher than exported units. According to International Monetary Fund [14] Kenya's GDP per capita reached US\$1,432 in 2015 as projected and compound annual growth rate (CAGR) would witness 7.5% growth during the time frame of 2000-2020. The authors [13] report observed that Kenya is relying on importation of vehicles to satisfy the domestic demand.

The import constitutes around 94% of trade in automotive sector; around 80% of imports comprise of used vehicles. Vehicles (commercial and passenger cars) are from among the top ten import segments in Kenya in value terms. In Pakistan, automotive sector makes a sizeable contribution to the economy in terms of investment, value added, employment and revenues. Pakistan's automotive sector registered strong growth in 2015, documenting 23.5% cumulative growth and making 33 % point contribution to the growth in large scale manufacturing sector presented in the report of state bank of Pakistan [15]. As against the production in year 2015 which was recorded at around 822 thousand vehicles, it was projected that production will experience hike and reach to 1,329 vehicles in year 2019 highlighted in the engineering development board report [16] and estimated market value in 2019 was projected to be US\$2.9 billion. In terms of employment generation, jobs created both directly and indirectly, in the automotive industry sector of Pakistan was projected to touch 1.5 million. Automotive industry in Pakistan is a large industry. The segments of the industry include cars, trucks/buses, two/three wheelers, and tractors. The automotive industry in Pakistan has fairly long history of manufacturing diverse vehicles vis-à-vis other Asian countries. Performance and competitiveness of the industry has remained an area of concern for industry as well as policy makers. The key issues confronted by the industry include among others; (1) lack of strong, enduring commitment in terms of consistent policies to develop the national automotive industry and domestic market unlike China where various demand stimulus programs are initiated on long term basis, (2) the [17] attracted many firms to launch new investments, however,

the desired results were not achieved due to deterioration in environments, (3) automotive industry is facing difficulties to raise local content components in totality and the industry competitiveness could not improve significantly due to lack of technological transformation and upgradation of technology in the area of parts manufacturing, (4) the automotive industry in Pakistan is facing a challenge in understanding the common automobile-related standards of quality, safety, and pollution control, and (5) Pakistan's automotive industry has not explored the potential of export market which normally offers strategic opportunity to infuse competitiveness at both levels, that is, industry and country [18].

The auto industry experienced downward trend in the year 2019 and sector experienced a 7.6% contraction in 2019 in comparison to growth of 18.9% last year. The reasons among other are: regulatory constraints, hike in interest rate, and significant depreciation of Pakistan currency; all these economic factors acting together have made a negative influence on the cost of production of vehicles [19]; hence lower competitiveness and performance. The authors [20] of NTNU, Trondheim, Norway in their study captured the theme of reinforcing competitiveness at international level. The study noted that MNCs in their global operations are more inclined toward developing a company-specific production system (XPS). The investigation focused on identifying the conditions which enable the firm to create competitive advantage utilizing the XPS, a term by and large synonymous with tailor-made corporate improvement systems. The researchers made use of explorative case study research technique to examine the linkage between competitive advantage and XPS.

III. RESEARCH METHODOLOGY

In this study which analyzed the significance of Porter's diamond demand conditions attribute in the context of the auto industry in Pakistan, the researchers adopted positivism philosophy mainly due to the reason that positivism embodies deterministic doctrine whereby logical causes administer the influences or results. In positivism, the focus remains on facts; scientific methods are deployed to measure facts and establish causal relationship and prediction in the study [21]. In this study survey research design was the integral part of the research methodology. 15 firms from among the active auto industry players were studied across various segments of the industry which included cars, trucks/buses, two/three wheeler and tractors. Automotive industry in Pakistan is concentrated in and around the major cities of Karachi, and Lahore; therefore these two cities formed the defined geographical area for the study.

Target population included CEOs and senior managers as well as the functional heads of the automotive firms. Simple random sampling was used to generate representative samples and explicit generalization from sample to the population becomes possible. In this study the sample size was computed 194. In the survey, the data was collected through self-administered structured questionnaire finalized after conducting the reliability and validity of the instrument through pilot test study. The researchers carried out the reliability test and used Cronbach alpha. Data collected

through the survey was further processed to carry out thorough data analysis. Data analysis was performed by using statistical package for social sciences (SPSS) version 22 as tool. Descriptive and inferential statistics were utilized in line with the research null hypothesis and study's specific objective.

To determine the strength of linear relationship between Porter's diamond demand conditions and firm's performance in the automotive industry of Pakistan Pearson correlation was used. The author [22] expressed that regression analysis model is in practice to examine the relationship between a single, two or more continuous outcome variable and predicting variables. In the study regression model was used and model's assumptions were tested i.e. normality, linearity, homoscedasticity, and multicollinearity. Ethical interest has three constructs, that is, association among science and society, matters concerning professional concerns, and treatment of research respondents [23]. These three key concerns focusing on ethical consideration were duly addressed by the researchers at all phases and levels of study.

IV. RESULTS AND FINDINGS

A. Cronbach's Alpha

For reliability coefficient Cronbach's alpha used in the pilot study to gauge the degree of internal homogeneity between variables measuring one concept/construct. According to author [24] coefficient fluctuates from range 0 to 1, internal homogeneity reliability is unsatisfactory if coefficient value is 0.6 or less than that. Acceptable internal consistency reliability measurement spans from .70 to .80 in social sciences field [25]. Cronbach's alpha coefficient of Porter diamond conditions is carried out by the researchers. In this case, $\alpha = .776$, which indicates that demand condition items have internal consistency. Table I presents the details.

TABLE I: CRONBACH'S ALPHA FOR DEMAND CONDITIONS

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.776	.786	15

Source: Authors (2019)

B. Descriptive Statistics

From total sample size of 194 the received questionnaires were 166 having a response rate (RR) 85.6% which was reasonable. The strategic management study in East Africa [26] registered 66% RR. Arithmetic mean was computed in the study and determined the value which is mostly equidistant in the dataset. In values summation of the dataset it was clear that majority of the respondents of the automotive industry in Pakistan upheld the point that improvement in design and need of innovation in the products is the key contributor to increased competitiveness of the firm as determined by mean score of 4.22. Similarly, the participants espoused to the notion that pressure from

demanding customers motivates the firm to improve its performance as shown by mean score of 4.17. The reasonably high mean score value of 4.11 on the statement that when domestic demand conditions among customers are sophisticated, there is an overall expectation for 'high quality' goods/services, points towards the fact that the respondents from the automotive industry are in agreement to this perspective. The point that demanding customers motivate the firms to improve the performance with a view to meet future needs of the customers has received the support of respondents with mean score of 4.11. Reasonable majority of participants maintained that upgradation of productive capabilities by automotive firms, in-line with the demands of customers, results in positive impact on the firm's performance as mean score value 4.08 was documented. Respondents with reasonable strength advocated that a sophisticated market can force organizations to produce world-class products as shown by mean score of 4.05. Table II presents the results.

TABLE II: MEAN AND STANDARD DEVIATION FOR PORTER'S DIAMOND DEMAND CONDITIONS

Items	Demand Conditions		
	Number	Mean	SD
Domestic demand conditions of customers are sophisticated, expectation for 'high quality' goods/services is high	166	4.11	.774
Meeting with high domestic demand conditions leads to high performance of the firm.	166	4.02	.887
High domestic demand of products results in innovation of products among the industry players.	166	3.90	.843
Improvement in design and innovation in the products is the key contributor to increase competitiveness of the firm.	166	4.22	.731
Domestic firms respond by upgrading their productive capabilities when customers demand for sophisticated products.	166	3.87	.857
Upgradation of productive capabilities by domestic firms, in-line with the demands of customers, results in positive impact on the firm's performance.	166	4.08	.670
Demanding customers is the key determinant force to bring about sophistication in the organization.	166	3.83	.874
National competitive advantage is the result of demanding customers in the industry.	166	3.84	.826
A sophisticated market can force organizations to produce world-class products.	166	4.05	.803
'Market dynamics' is the only determinant leading to world-class accepted products.	166	3.59	.915
A sophisticated market leads the firm to enjoy competitive advantage in the international market.	166	3.75	.734
Pressure from demanding customers motivates the firm to improve its performance.	166	4.17	.696
Sophisticated customers pressurize the firms to improve the performance in order to meet the existing needs of the customers.	166	4.05	.773

Demanding customers motivate the firms to improve the performance with a view to meet future needs of the customers.	166	4.11	.779
Meeting the existing needs of demanding customers leads the firms to national competitive advantage.	166	3.98	.678
National competitive advantage can be achieved by meeting the future needs of the customers.	166	3.94	.792

Sd (Standard Deviation)

Source: Authors (2019)

C. Inferential Statistics

The strength of a linear relationship between paired data was statistically measured by Pearson's correlation coefficient in the study focusing on automotive industry involving 166 respondents who provided their perspectives on the structured questionnaire with the main purpose to determine the influence of Porter's diamond demand conditions determinant on the auto industry of Pakistan. In the study, Pearson's coefficient was used on variables (demand conditions determinant of Porter diamond being independent variable and firm's performance operating in automotive sector of Pakistan being dependent variable) and linear association measured on paired data. Based on results significance level is $p < .05$. Pearson's correlation coefficient test results found out that demand conditions being independent determinant do influence firm's performance in the automotive industry of Pakistan as they are less than moderately positively and linearly correlated with firm's performance $r = .244$, $p < .05$. Correlation is significant at the 0.05 level (2-tailed). Table III indicates the results on correlation between demand conditions index and firm's performance.

TABLE III: CORRELATION BETWEEN PORTER DIAMOND CONDITIONS INDEX AND FIRM'S PERFORMANCE

Model		Firm's Performance
Demand Conditions	Pearson Correlation	.224
	Sig. (2-tailed)	.004
	N	166

Source: Authors (2019)

The model summary depicts how the demand conditions determinant influences and predicts firm's performance in the automotive industry of Pakistan by using the regression analysis outputs. The predictor variable, demand conditions is (independent variable) and firm's performance is (dependent variable). In the model summary results R explained the relationship between the observed values and predicted values of the dependent variable, firm's performance. The value of R maintains - 1 to 1 range. The R sign depicts the direction positive or negative relationship. In the model summary $r = .244$

indicated the strength of demand conditions as a determinant of firm's performance and the relationship which is positive. The coefficient of determination R square is .050; it means that 5% of variation in the performance of Pakistan automobile firms is caused by demand conditions. The remaining 95% is caused by other factors not considered in the study together with the error term. A. predictors: (constant), demand conditions b. dependent variable: firm's performance. Table IV presents model summary results of Porter framework demand conditions influence on firm's performance.

TABLE IV: MODEL SUMMARY OF PORTER'S DIAMOND DEMAND CONDITIONS INFLUENCE ON FIRM'S PERFORMANCE

Model	R	R Square	Ad. R Square	Std. Error of the Estimate	Durbin-Watson
1	.224	.050	.045	1.69300573667	1.431

Source: Authors (2019)

Apart from R-squared as explained above, analysis of variance (ANOVA) is applied to investigate how regression model fits the data appropriately. The F statistics indicates the regression mean square divided by the residual mean square. In the event significance value of F statistics is lower than 0.05; it is inferred that the independent variable performed an appropriate job in describing the variation in dependent variables. From the model findings p-value=.004, meaning thereby that regression model is significant, $F=8.698$, $df=1$, $p<.05$. In addition, residual mean square is lower than the mean square of regression, indicating that regression model construct is better poised to predict the equation results than using the mean equation in predicting the outcomes. a. predictors: (constant), demand conditions b. dependent variable: firm's performance. Table V provides the outcomes on ANOVA of Porter diamond demand conditions influence on firm's performance.

TABLE V: ANOVA OF PORTER DIAMOND DEMAND CONDITIONS INFLUENCE ON FIRM'S PERFORMANCE

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	24.932	1	24.932	8.698	.004
	Residual	470.068	164	2.866		
	Total	495.000	165			

Source: Authors (2019)

In the study it was found out that Porter's diamond determinant demand conditions significantly predicted the firm's performance, $\beta = -3.564$, $\beta_1 = 0.898$, $p = .004$ since the p value was less than <.05 set by the study. These findings of the result implied that rejection of null hypothesis and the alternative hypothesis is considered as true. The research study safely concludes that Porter's diamond determinant demand conditions significantly influences firm's performance in the automotive industry of Pakistan. a. predictors: (constant), demand conditions b. dependent variable: firm's performance. Table VI presents the statistical results on coefficients of Porter diamond demand conditions influence on firm's performance.

TABLE VI: COEFFICIENTS OF PORTER DIAMOND DEMAND CONDITIONS INFLUENCE ON FIRM'S PERFORMANCE

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.564	1.216		-2.932	.004
	Demand Conditions	.898	.304	.224	2.949	.004

Source: Authors (2019)

Based upon the study findings, the study derived the model for Porter's diamond determinant demand conditions and firm's performance. Based on the simple regression model;

$$Y = \beta_0 + \beta_1 X_1 + \epsilon$$

Y = Firm's performance

X₁ = Demand conditions

The model equation therefore becomes;

Firm's performance = -3.564 (constant) + 0.898(demand conditions)

The model implies that for every unit increase in Porter's diamond determinant demand conditions, firm's performance increases by 0.898 units in the automotive industry of Pakistan. The study found out that demand conditions significantly predicted firm's performance thus rejected the null hypothesis, H₀₁: Porter's diamond demand conditions determinant does not influence firm's performance.

V. DISCUSSION OF RESULTS

The study sought to assess the influence of Porter's diamond demand conditions attribute on the performance of the automotive industry in Pakistan. Based on results of the study it was inferred that demand conditions attribute of Porter's diamond influence the performance of firms in the auto industry of Pakistan. Correlation analysis results draw the inference that there is relationship between Porter's diamond demand conditions and firm's performance and found out that demand conditions do contribute in influencing firm's performance $r = .224$, $p < .05$. These results are partially in agreement with scholar [1] who argued that in the presence of sophisticated customers' local demand and expectation of high quality of goods and services, domestic firms do manage to respond to these expectations by improving their capabilities and competencies in overall context. Sophistication of market can serve as a pull force, pushing and driving the firms toward producing world-class products and services. A different way of putting it is that demanding and sophisticated customers drive the organization to transform to being more sophisticated, hence, resulting into national competitiveness and high performance. The study found out that sophisticated market in the automotive industry of Pakistan can drive organizations to produce world-class automotive products and enjoy competitive advantage in the international market. In contrast, the author [20] of NTNU, Trondheim, Norway in their study captured the theme of improving competitiveness

at international level. The study noted that MNCs in their global operations are more inclined toward developing a company-specific production system (XPS). The investigation focused on identifying the conditions which enable the firm to create competitive advantage utilizing the XPS, a term by and large synonymous with tailor-made corporate improvement systems.

In the current automotive industry scenario the studies on porter diamond model along with demand conditions applications are completely absent and it has adversely affected the overall performance of the industry. This argument is supported by study carried out by (JICA, 2011) which noted that Pakistan auto industry lacks the push exercised by strong domestic demand conditions; rather it is experiencing lack of strong, enduring commitment in terms of consistent policies to develop the national automotive industry and domestic market unlike China where various demand stimulus programs are initiated on long term basis, among others. The research study and objectively drawn conclusions reject the null hypothesis H_{01} : Porter's diamond demand conditions determinant does not influence firm's performance in the automotive industry of Pakistan which are in line with Porter's study. In addition, it is evident that Porter's diamond demand conditions with its sub-constructs may provide impetus to firms in the automotive industry of Pakistan to contribute moderately in improving the performance of firms.

VI. CONCLUSIONS AND RECOMMENDATIONS

From the study it was construed that sub-constructs of Porter diamond demand conditions have positive linear relationship with the performance of the auto industry players competing and operating in the competitive arena. The sub-constructs constituting demand conditions as influencing force included: a sophisticated market in automotive industry of Pakistan can force organizations to produce world-class automotive products, market dynamics is the determinant force leading to world-class accepted products, a sophisticated market leads the firm to enjoy competitive advantage in the international market, the pressure from demanding customers in the automotive sector motivates the industry players to improve their performance and competitiveness, meeting existing needs of demanding customers results into national competitive advantage, and finally, meeting the future needs of the customers related to automotive products having influence on the national competitiveness.

The study concluded that 'demand conditions' determinant of Porter's diamond model influences the progressive manufacturers and assemblers of cars, trucks and buses, light commercial vehicles (LCVs), motor cycles, and three wheelers performance and predicts an increase .050 for every incremental rise in demand conditions in the automotive industry of Pakistan. It is recommended that essentially, increased focus on the demand conditions sub-constructs like: sophisticated domestic market, demanding customers and striving to meet the existing as well as the future needs of demanding customers will drive the industry toward achieving

national competitive advantage by augmenting their performance. Based on the results drawn from the research it is conclusive to further recommend that government of Pakistan should internalize the quintessential virtue of Porter's diamond model demand conditions determinant and align the automotive industry policy and supportive measures to foster local demand to help achieve the national competitive advantage in the automotive industry of Pakistan. The results and conclusions of the study may serve as significant contribution for constituencies like academia, firms in automotive industry, and government at policy making level. The results of study are Pakistan auto industry-specific; the study recommends undertaking further empirical studies to determine the influence of Porter's diamond along with its broad based determinants to make contribution toward industry's competitiveness. This may provide impetus to capture and further enrich the broader perspective on Porter's diamond model.

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