EFFECT OF NEW DRUG PRODUCTS DEVELOPMENT SPEED, LEARNING DEMAND, CUSTOMER PARTICIPATION ON NEW DRUG PRODUCT DEVELOPMENT PERFORMANCE IN THAILAND

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Abstract

The speed of new product development (NPD) has become increasingly significant for many organizations for the enhancement of the performance of new products because NPD manages all the aspects of performance with fast-changing conditions of business. Though, the main objective of this research paper is to investigate the impact of customer participation (CP) on the performance of new drug development of the pharmaceutical sector of Thailand. The mediating role of new drug development (NDD) speed and learning demand were also been identified in the study to check the further performance of new drug development. The results of this research paper indicate that organizations that involve customers and collaborate with consumers during the development of products ay significant levels are mainly able to enhance the performance of products. Furthermore, the results of this research study also indicate that new drug development speed can positively mediate the relationship between CP and NDD performance. The results also revealed that CP in the development process of products allows organizations to better manage the performance of products mainly by improving the speed of product development. A significant implication of the research is the evaluation of additional mediating variables regarding CP and its effects on the performance of products.

Keywords: Customer participation, new drug development speed, learning demand, new drug development performance

1. INTRODUCTION

Volatile preferences of the customers and the rapid advancements made in the field of technology has enhanced the efficiency of the manufacturing industries to develop new products and maintain competitive advantages in the market (Abbasi, 2018; Chambers, Feero, & Khoury, 2016; Dolgos et al., 2016; Rosen & Dietz, 2017). Development of new drugs is essential for the competitiveness of the pharmaceutical industries and that is why a number of manufacturing industries are focusing on the quick production of new drugs from the stage of idea sharing to the production of drug (Babal & Moreno, 2019; L. Fang et al., 2018; Khanna, Guler, & Nerkar, 2016; Kraus, 2018). The idea generation of a new drug must be according to the demand of consumers. Therefore, it is necessary for the industries to learn about the market demands, which can be enhanced through initiating customer participation (Ahneman, Estrada, Lin, Dreher, & Doyle, 2018; Berry-Kravis et al., 2018; Brinke, 2017; Hinton, 2018).

The market performance of the new drugs highly gets effected form the level of the manufacturer. The small and medium industries have to face much more complexities than the big firms (Abbasi, 2018; Chambers et al., 2016; Dolgos et al., 2016; Rosen & Dietz, 2017). This is because of the lack of resources and the economies of scale along with the low level of bargaining with the suppliers (Barling, Akers, & Beiko, 2018; Beam & Kohane, 2018;

Fernandes, Larsen, & Chan, 2017; Volk, 2017). Therefore, the medium level firms have to spend more time on the market research and also have to gather more information about consumer preferences by engaging them in related activities or getting feedback from them about the products (Babal & Moreno, 2019; L. Fang et al., 2018; Khanna et al., 2016; Kraus, 2018).
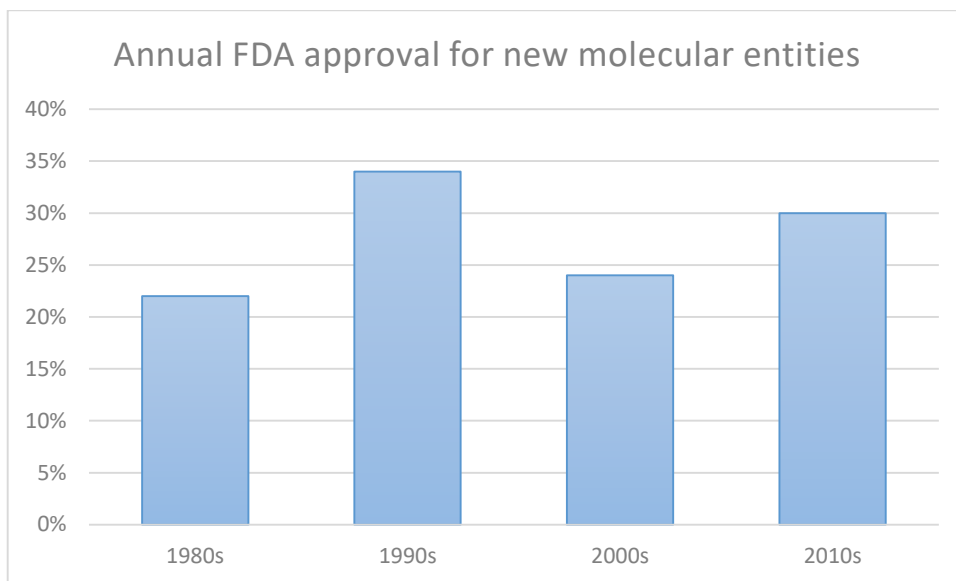

Figure 1: Average annual FDA approval for new molecular entities
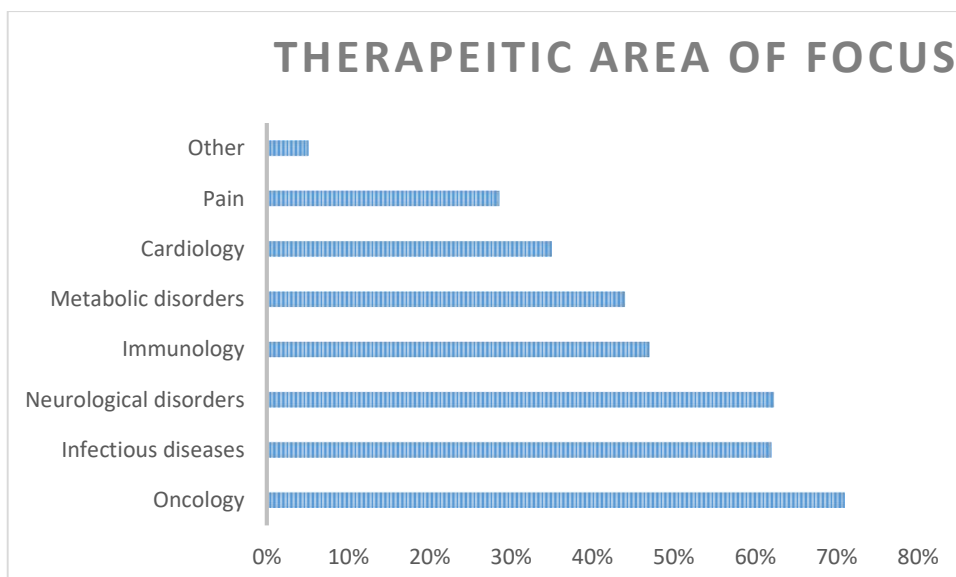
Source: Science Innovation Union

Figure 2: Area of focus of new drug development.

Source: (Addconsortium)

Following are the research objectives for the study:

To determine the impact of customer participation on the new drug development speed.

To determine the impact of customer participation on the learning demand.

To determine the impact of customer participation on the new drug development performance.

To determine the impact of the new drug development speed on the new drug development performance.

To determine the impact of the learning team on the new drug development performance.

The present study has contribution in the theoretical and practical significance of the participation of customers in effecting the development speed and performance of the new drug in the market. The availability of such information is essential for the pharmaceutical industries so that they can look for ways to improve their performance (Ahneman et al., 2018; Berry-Kravis et al., 2018; Brinke, 2017; Hinton, 2018). Moreover, the research study will also provide information regarding the strategic planning process needed for the development of a new drug and the importance of learning demand in this strategic planning. Remainder of the study will provide the literature that had been reviewed and the methodology used for the study along with the results in discussion.

2.   REVIEW OF LITERATURE

2.1   Theoretical background

To gain competitive benefits from the market and have a sustainable business there is a need to have speed in the development of new products that will attract the potential customers (Barling et al., 2018; Beam & Kohane, 2018; Fernandes et al., 2017; Volk, 2017). Competition is increasing at the great pace in the market and that is why the industries have to look for ways to maintain and sustain their position among the competitors. Moreover, the speed of introducing new products in the market also helps the firm to engage its customers (Colman, Figueroa, McCracken, & Hebbar, 2019; DelConte & Gast, 2019; Haenssle et al., 2018; Jha, 2018; Khullar, Wolfson, & Casalino, 2018). It has been observed that if the speed of developing or introducing a new product in the market is slow, the company does has to face many issues because of the decreased life cycle of products in today's time.

2.2   The impact of customer participation on the new drug development speed

Customer have a vital role in the profitability and business performance of any organization. If a firm manages to hold its customers and have a great sum of loyal ones, the overall business performance of that organization will boost and it has also been observed in a number of literature studies (Colman et al., 2019; DelConte & Gast, 2019; Haenssle et al., 2018; Jha, 2018; Khullar et al., 2018). Moreover, it has also observed that the organization that makes their customers participate in the organizational activities, gain a high level of strategic resources. Through this, the organization speed up their development process of the new

products (Andrade et al., 2016; Denny, Van Driest, Wei, & Roden, 2018; Kim, Song, Lindquist, & Kang, 2016; Mak & Pichika, 2019; Tschan, Semmer, Vetterli, Hunziker, & Marsch, 2019). Therefore, the studies have supported the development of the following hypothesis:

H1: There is a significant relationship between the customer participation and the new drug development speed.

2.3   The impact of customer participation on the learning demand

Through the participation of customers in the learning activities, the organizations become able to have information about the market and also learn about the first hand solutions that can be used to work on the new and innovative ideas (Colman et al., 2019; Haenssle et al., 2018; Jha, 2018). Efficiency in the processes and structure of the firms is also gained through this learning. Therefore, the organizations does focus on the learning demand and tend to gain more knowledge about the various aspects of market (DelConte & Gast, 2019; Fernandes et al., 2017; Khullar et al., 2018; Volk, 2017) to analyze the performance of the new products. Therefore, the studies have supported the development of the following hypothesis:

H2: There is a significant relationship between the customer participation and the learning demand.

2.4   The impact of customer participation on the new drug development performance

A sit has been observed though the various literature studies that the customers have a vital role in the market performance of the businesses (Andrade et al., 2016; Denny et al., 2018; Kim et al., 2016; Mak & Pichika, 2019; Tschan et al., 2019) and so does improving the performance of the new products also. Research studies (Barling et al., 2018; Beam & Kohane, 2018; Berry-Kravis et al., 2018; Brinke, 2017; Hinton, 2018) also shows that the organizations that are more actively involved in engaging their customers in the organizational activates are more likely to have loyal customers who look forward to the new products released by the company. That is why the customer participation is important for the performance improvement (Ahneman et al., 2018; Babal & Moreno, 2019; L. Fang et al., 2018; Kraus, 2018). Therefore, the studies have supported the development of the following hypothesis:

H3: There is a significant relationship between the customer participation and the new drug development performance.

2.5   The impact of the new drug development speed on the new drug development performance

Speedy introduction of new products in the market is essential for sustaining business performance (DelConte & Gast, 2019; Fernandes et al., 2017; Khullar et al., 2018; Volk, 2017). Research studies (Barling et al., 2018; Beam & Kohane, 2018; Berry-Kravis et al., 2018; Brinke, 2017; Hinton, 2018) have also emphasized on the importance of introduction of new products on the overall market performance of nay business. This is because of the consumer engagement in the company through the regular release of new products (Abbasi, 2018; Chambers et al., 2016; Dolgos et al., 2016; Khanna et al., 2016; Rosen & Dietz, 2017). Therefore, the studies have supported the development of the following hypothesis:

H4: There is a significant relationship between the new drug development speed and the new drug development performance.

2.6 The impact of the learning team on the new drug development performance

The learning team also has a vital role similar to the customer participation because the learning team will be involved in increasing the knowledge (Ahneman et al., 2018; Babal & Moreno, 2019; L. Fang et al., 2018; Kraus, 2018) of the organization regarding the market demands and trends. Research studies have also shown the evidence of vitality of the learning team on the improvement of performance of the new products in the market (Abbasi, 2018; Chambers et al., 2016; Dolgos et al., 2016; Khanna et al., 2016; Rosen & Dietz, 2017). Therefore, the studies have supported the development of the following hypothesis:
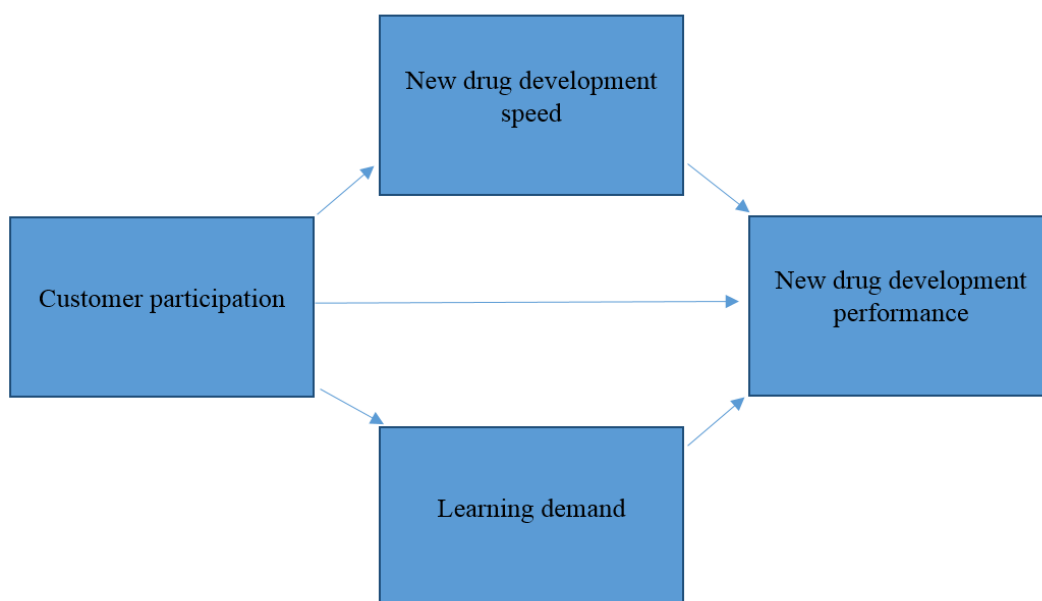
H5: There is a significant relationship between the learning team and the new drug development speed.

2.7 Theoretical model

3. METHODOLOGY

3.1 Data and sample

This research was executed in Thailand, to explore the impact of customer participation in improving drug performance. The targeted sector for this research was Thailand pharmaceutical sector, as it is the largest market over there and make significant contributions in Thailand economy and is subjective to changing trends, quality standards etc. Data for following resizes was derived from customers, using purposive sample a final sample was

developed of 345 customers. For data collection the tool that was used was questionnaire, respondents were contacted through email with link to google forms. Contact details were obtained from pharmaceutical stores and health centers customer data base. Two email were sent one was explanatory followed by an email containing questionnaire. Four hundred and sixty (460) questionnaires were mailed to those who replied back, but out of which 65 were erased due to insufficient data, so only 345 were retained for further analysis. Demographic analysis shows that 52.70% were male managers and 47.30% were females, 30% have post-graduation degree, 45% have graduation level education and 25% had college level qualification.

3.2 Measurements

All items originated from past studies that are related to current proposed variables. Some scales were used without any changes and some were changed in accordance with our research context. This questionnaire was reviewed by expert to make it free from any content error. 5 point Likert scale was adopted to measure the Reponses.

3.2.1 New drug development performance

The dependent variable that was New drug development performance was measured by employing Atuahene-Gima and Ko (2001) NPD Performance scale modified version. 12 items adapted to measure the performance of new drug, sample item is "New products/services at my firm generally achieve its sales and customer use objectives" with options 1=strongly disagree and 5= strongly disagree. With α= 0.94 as Cronbach Alpha.

3.2.2 Customer participation

Customer participation (CP) is computed applying 8 items adapted from (E. Fang, Palmatier, & Evans, 2008) research paper. Ten items including "How deeply do customers participate in idea generation" to estimate the influence of customers. Responses were noted on 5 Point-Likert scale ranging from 1=very slow to 5= very fast. Statistical finding showed α= 0.93 composite reliability for CP.

3.2.3 New Product Development Speed

To operationalize New product development speed Rindfleisch and Moorman (2001) scale was utilized, from which three items scale were utilized to measure how speedily a business develop new drug. Sample it is "The speed of new product development of our firm is much faster than the industry norm". Responses were rated on Five-point scale ranging from 1=strongly disagree to 5= strongly agree having Cronbach Alpha α=0.85.

3.2.4 Learning Demand

Measures for learning demands were taken from The Quality of Governance Standard Dataset by Teorell et al. (2015), four items were used to estimate the demand of learning of a firm for example " current firm need to learn in order to address the needs using 5 Likert scale showing α =0.847 as composite reliability.

3.3 Analysis techniques

Data for this study was analyzed by running multiple statistical tests on SPSS and AMOS. The variables were tested by calculating of Cronbach's alpha (CA), composite reliability (CR) and average variance extracted (AVE) At last, calculated the square root of the AVE (SQAVE). AMOS was operated for testing and analyzing, we performed CFA and descriptive statistics test on data.

4. DATA ANALYSIS

4.1 Demographics

A sample of 298 selected respondents was constructed for the study, out of which 52.3% were male and 47.7% were female. The effective reason for the disparity of gender is the fact that more males were identified to be employed in the production units of the pharmaceutical sectors of Thailand. The age of 32.6% of the individuals was up to 40 years. The major objective of this section is the level of individuals or workers approached.

4.2 Descriptive statistics

Table 1 contains the representation of maximum as well as minimum values, coefficients of means and skewness are also evaluated in this section to check the data for the existence of outliers. This section also evaluated the normality of data and the inclination of responses. The values of skewness are mainly fallen within the category of -1 and +1, which mainly exhibits the normality of collected data.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
CustPart	298	1.00	5.00	3.5802	1.05250	-.884	.141
NDDS	298	1.00	5.00	3.5285	1.11938	-.684	.141
LearDem	298	1.00	5.00	3.5479	1.05854	-.784	.141
NDDP	298	1.00	5.00	3.4345	1.09442	-.623	.141
Valid N (listwise)	298						

4.3 Factor loading and convergent validity

Factor loading proves to be very helpful in analyzing the correlation coefficient for the factor and the variable (Hassan, Hameed, Basheer, & Ali, 2020; Iqbal & Hameed, 2020). Factor loading also indicates the variance manifest by the variable on the particular factor. As table 2 indicates, almost all the items are positive and effective, the loadings are mainly higher than 0.7. The issue of cross-loading has not been perceived as well.

Table 2: Factor Loading and Convergent Validity

	1	2	3	4	CR	AVE
CP1		.682			0.945	0.685
CP2		.754				
CP3		.804				
CP4		.822				
CP5		.774				
CP6		.788				
CP7		.814				
CP8		.816				
NDDS1				.795	0.901	0.748
NDDS2				.804		
NDDS3				.798		
LD1			.795		0.914	0.731
LD2			.843			
LD3			.858			
LD4			.782			
NDDP1	.822				0.968	0.720
NDDP2	.847					
NDDP3	.860					
NDDP4	.871					
NDDP5	.851					
NDDP6	.865					
NDDP7	.794					
NDDP8	.808					
NDDP9	.805					
NDDP10	.824					
NDDP11	.781					
NDDP12	.801					

4.4 Discriminant validity

Divergent validity is a significant type of validity test that shows the existence of relationships. Discriminant validity is presented in table 3 which shows that discriminant validity is present.

Table 3: Discriminant Validity

	NDDS	CP	LD	NDDP
NDDS	**0.867**			
CP	0.641	**0.827**		
LD	0.605	0.563	**0.854**	
NDDP	0.401	0.525	0.431	**0.848**

4.5 Model fitness (confirmatory factor analysis)

Confirmatory factor analysis is the most significant type of factor analysis and their results are shown in Table 4. The CMIN and DF values are 2.74 which is less than 3, and GIF is higher is 0.8(0.83), IFI is also greater than 0.9(0.92) and on the other hand RMSEA value is less than the 0.08(0.076). According to table 4 threshold values are being satisfied, hence the model is valid.

Table 4: Confirmatory Factors Analysis and KMO

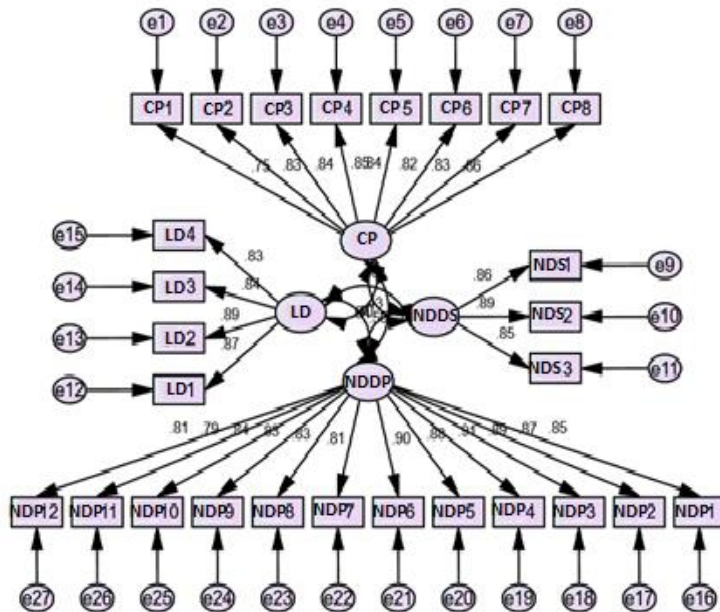| CFA Indicators	CMIN/DF	GFI	IFI	CFI	RMSEA	KMO
Threshold Value	≤ 3	≥ 0.80	≥ 0.90	≥ 0.90	≤ 0.08	0.6 – 1.0
Observed Value	2.742	0.831	0.928	0.928	0.076	0.942

Figure 1: CFA

4.6 SEM

A positive unit change in CustPart produces a favorable effect of 0.38 in NDDS, the relationship is effective, and hence the hypotheses are accepted and supported to results. A point change in CustPart develops a positive effect of 0.51 in LearDim, the relationship is favorable, and so the hypothesis is also accepted. A unitary enhancement in CustPart and NDDS generated variations of 0.38 and 0.5 in NDDP. The relationship is positive and therefore the hypotheses are supported. All the mediation results and outcomes are favorable and positive therefore all the hypotheses are accepted.

Table 5: Structural Equation Modeling

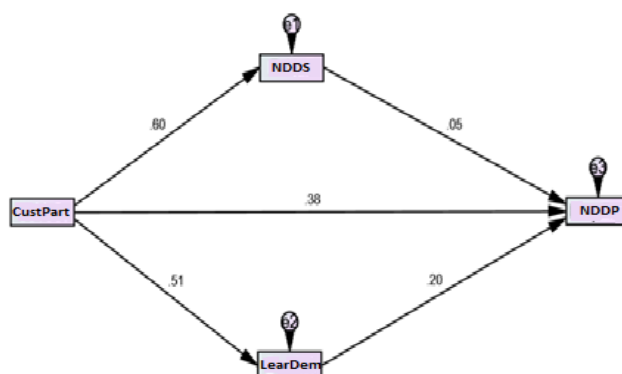|	Path		Estimate	S.E.	P	Decision
NDDS	<---	CustPart	.601	.048	***	Accepted
LearDem	<---	CustPart	.512	.051	***	Accepted
NDDP	<---	CustPart	.382	.071	***	Accepted
NDDP	<---	NDDS	.052	.058	.048	Accepted
NDDP	<---	LearDem	.197	.057	***	Accepted

Figure 2: SEM

5. DISCUSSION AND CONCLUSION

5.1 Discussion

Customer participation (CP) is an important term and factor for businesses because it mainly refers to the active participation of consumers during and after the development of products (Dong & Sivakumar, 2017). In this case, the participation of customers has been evaluated during the development of new drugs and their performance. The results of this research show that customer participation plays a positive role in enhancing the performance of new drug development. A study has indicated that Morgan, Obal, and Anokhin (2018) customer participation has been significant because during the development of products customers and consumers can offer useful and effective solutions related to product development through useful knowledge. Therefore, the hypotheses about the direct impact of CP on new drug development performance have been accepted.

New drug development (NDD) speed has become significantly important for enhancing and managing the performance of new drug development mainly due to continuous minimization in the life cycle time of products. Therefore, the hypothesis has been accepted and indicates positive outcomes. The results of the study also revealed that learning demand also plays a positive role in improving the relationship between CP and NDD performance.

5.2 Conclusion

The research paper signifies the participation of the customers regarding better new drug performance in Thailand pharmaceutical sectors and the industry. The rate and the speed of the new drug development can be increased at the best level. The customers are the backbone and the source of progress and success. The research also indicates that the positive participation of the customers can take the industry at a higher level as the demand increases the supply is made and the Thailand pharmaceutical industry needs to implement this principle for this major purpose.

5.3 Implications and Limitations

The study undertaken provides a detailed idea that customer participation has a vital role in the better New Drug performance in the industry of Thailand Pharmaceutical sector. This study also provides a vast place for future researchers to find more means and ways to enhance the performance and the quality of working in the field of pharmaceutical sectors.

The significant results and outcomes of this research need to be clarifying in light of limitations. First, this research is limited to the role of customer participation in evaluating the performance of new drugs, so, due to this limitation; it is highly recommended to future analysts that they should add other independent variables to get more accurate results. Second, fewer consumers involved in the process of new product development, thus, it is proposed to future studies that they should involve a large number of customers to get wider outcomes. Another limitation of this research is that in this study the long term involvement of consumers in new drug performance does not evaluate.

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