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A Study of Relationship between Open Innovation & Business Model Innovation with Firm Performance

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ABSTRACT: Small and Medium Enterprises (SMEs) have played a vital role in growth of rural India especially Punjab. They have provided ample employment opportunities through infrastructural developments. In order to diversify and grow further, SMEs need to undertake innovative practices to form a competitive advantage by incorporating innovation through different ways. This paper examines the relationship between Open Innovation & Business Model Innovation with Firm Performance. The study interviewed 120 respondents with structured questionnaire. It is a descriptive study exploring relationship through linear modeling. The results of the study show significant and positive relationship between Open Innovation & Business Model Innovation with Firm Performance.

Keywords: Automatic Linear Modeling, Business Model Innovation, Firm Performance, Open Innovation, Shapiro-Wilk test

I. INTRODUCTION

The business model is the center of worth creation for businesses a critical mean of increasing an upper hand (Chesbrough and Rosenbloom, 2002) [6]. The business model innovation may be considered as open door for existing ventures to re-concoct a totally distinctive business model, and change customer value and value delivery methods (Markides, 2006; Matthyssens *et al.,* 2006; Moore, 2004) [18,19,17].With advancing innovation, previously established results need to be researched againin order to develop new business models (Voelpel *et al.,* 2004) [23]. Business model innovation is defined as repositioning a customer value proposition (CVP), including the redesigning the profit formula and identification of key resources and processes (Johnson *et al.,*2008; Moore, 2004) [11,17].
Chesbrough (2003a) presented the idea of open innovation; an expanding need to embrace an open innovation model endures. This is serving to grow new thoughts, as well as produces more imaginative so they can be viable and upgrade execution, when contrasted with customary innovation, "open innovation" focused by Chesbrough (2003a), depicts a center idea of undertakings developing through their already shut ways to take in more creative thoughts from the outer environment while offering one of a kind inventive thoughts to different associations, creating creative imparting. Open innovation means eradicating limits in the middle of organizations and their surroundings as inventive thoughts move through distinctive association [2].

II. REVIEW OF LITERATURE

Al-Ansari, Y. *et al.* (2013) studied imaginative attributes of SMEs and the relationship between their innovation and business performance in rising Dubai market. Information was gathered from 200 SMEs and an organized overview was utilized, created from an efficient writing survey. Both enlightening and inferential measurements were utilized to assess the discoveries. Discoveries depicted the creative qualities of SMEs and critical positive connection in the middle of innovation and business performance. Study offers SMEs with inventive practices a superior viewpoint of their business and business situations [1].
Pooran, W. (2013) examined the impact of open innovation practices on innovation capabilities and export performance of UK based small and medium enterprises. This study involves a quantitative investigation of 64 SMEs that included 31 closed innovation firms and 33 open innovation firms. The results of this study demonstrated that the export performance of such firms were highly dependent upon R&D strategy and management structure and competences. The two external factors were also found to be equally influencing i.e. technological development and the ability of the firm to attract government grants. The results showed that innovation activities have a complex and

multi faceted impact on performance of firm [21].

Letangule, S.L. and Letting, N.K. (2012) investigated the effect of innovation strategies adopted by firms in the telecommunication industry in Kenya to increase performance. Data was analyzed though descriptive statistics and the relationship between the variables established using regression analysis**.** This study collected quantitative data from 40 managers from the four key players in the telecommunication industry in Kenya (Safaricom ltd, Airtel, Essar and Orange) using a self-administered questionnaire with a five point Likert scaled questions. The data was presented through percentages, means, standard deviations and frequencies. The paper concluded that adoption of innovation strategies affected performance of the firms to a great extent [13].

Gunday G. *et. al.* (2011) explored innovations and their effects on firm performance by examining product, process, marketing and organizational innovations, as well as by focusing on various aspects of firm performance such as innovative performance, production performance, market performance and financial performance. The study revealed that innovation strategy is an important major driver of firm performance and should be developed and executed as an integral part of the business strategy [7].

Yu-Lin, W. *et. al.* (2010) examined the relationship between knowledge absorptive capacity and innovation performance in small and medium enterprises (SMEs). Data were collected from research and development (R&D) managers or owners of 49 SMEs of the bicycle industry in Taiwan. Results of the study showed that the holder's specialized and mechanical encounters best-clarified absorptive limit of a SME. Thus, the absorptive limit and the information procurement exercises of a SME influence its innovation performance. Since the information was restricted to automotive industry, future studies need to accept these discoveries in the SMEs of different commercial enterprises [24].

III. OBJECTIVES OF THE STUDY

a. To study the influence of open innovation on firm performance.
b. To study the influence of business model innovation on firm performance.

IV. RESEARCH METHODOLOGY

A. Dependent and Independent Variables

The study considers open innovation and business model innovation as independent variables while firm performance as dependent variable.

B. Sampling Technique

A sample size of 120 participants is interviewed for responses. Number of samples from different cities is proportionate to the total population. Random sampling technique is used for selecting samples. Random sample tables are applied on list of SMEs. The use of SRS method in the selection of participant has reduced bias to the minimum. The methodology employed in this research involves a combination of questionnaire, and personal interview.

C. Data Collection

Data collection is done with the help of structured questionnaire. Questionnaire is divided into five sections; inbound open innovation, outbound open innovation, business model innovation, firm performance and demographics offirm.

D. Data Analysis

To arrive at important analysis, the collected data is analyzed using SPSS package. To arrive at certain end result regarding the guess advanced in the process investigation, descriptive, cross tabulation and automatic linear modeling will be applied.

E. Measurement Scales

Table 1: Measurement scales.

Scale	Authors
Inbound Open Innovation	Laursen and Salter (2006); Van de Vrande *et al*. (2009)[12, 22]
Outbound Open Innovation	Chesbrough and Garman (2009); Lichtenthaler (2008) [4, 14]
Business Model Innovation	Johnson *et al.* (2008); Moore (2004) [11,17]

V. DATA ANALYSIS

A. Number of Employees

Table 2: Classification of SMEs on the basis of number of employees.

Number	Count	Percentage
1	9	6.0%
2-3	5	3.4%
4-5	13	8.7%
6-9	23	15.4%
10-19	32	21.5%
20-49	18	12.1%
>49	19	12.8%

The distribution of number of employees in responding SMEs varied from 1 to 200, however, for the purpose of analysis, the categorization was done as shown in the above table. 21.5% SMEs has 10 to 19 employees; similar percentage of SMEs (12.1% & 12.8%) had 20-49 and more than 49 employees.

B. Industry Analysis

Majority of the data was collected from SMEs from manufacturing industries, 102 (68.5%), manufacturing SMEs were considered for the study. Apart from that few Wholesale and Retail commerce (8.1%) and Hotels and Restaurants (3.4%) SMEs were included in the study.

Table 3: Classification of SMEs on the basis of industry.

Industry	Count	Percentage
Wholesale and Retail commerce	12	8.1%
Manufacturing	102	68.5%
Construction	0	0.0%
Hotels and Restaurants	5	3.4%
Real estate	0	0.0%
Transports and communication	0	0.0%
Entertainment and Sports	0	0.0%
Health and Social Care	0	0.0%
Education	0	0.0%
Others	0	0.0%

C. Age of Organization

Table 4: Classification of SMEs on the basis of age.

Age (in years)	Count	Percentage
1-3	9	6.0%
4-10	37	24.8%
11-20	35	23.5%
21-40	24	16.1%
>40	4	2.7%

The age of the organizations considered varied between 2 years to more than 60 years. For the analysis purposes, the classification was done as stated in the above table.

D. Owner or Manager

Whether the SME's functions were managed by the owner himself or were there a designated position of a qualified manager to manage the firm's functions.

Yes = There is a Manager,

No = Owner himself acts as the manager

Table 5: Classification of SMEs on the basis of type of ownership.

Owner Managed	Count	Percentage
Yes	84	56.4%
No	35	23.5%

E. Size of Firm

Table 6: Classification of SMEs on the basis of sales volume.

Sales Volume (in INR)	Count	Percentage
0-25 Lac	12	8.1%
26-50 Lac	8	5.4%
51-75 Lac	12	8.1%
76Lac-1 Cr	8	5.4%
1-5 Cr	29	19.5%
>5Cr	50	33.6%

F. Normality of Data

For an alpha value of 0.05, the p-value of Shapiro-Wilk test for the data set rejects the null hypothesis that the data are from a normally distributed population. The figure shows that the residuals for firm performance is not normal and is skewed toward positive side of the mean value.

VI. HYPOTHESIS TESTING

The model summary for Automatic Linear Modeling is shown below. The target for this model is performance of the organization to understand the relationship between various independent variables and performance of the firm.

Table 7: Model selection criterion.

Target	Firm Performance
Automatic Data Preparation	On
Model Selection Method	Forward Stepwise
Information Criterion	5.062

A. Predictor Importance

The predictor importance of independent variables for determining firm performance is shown in the following figure.

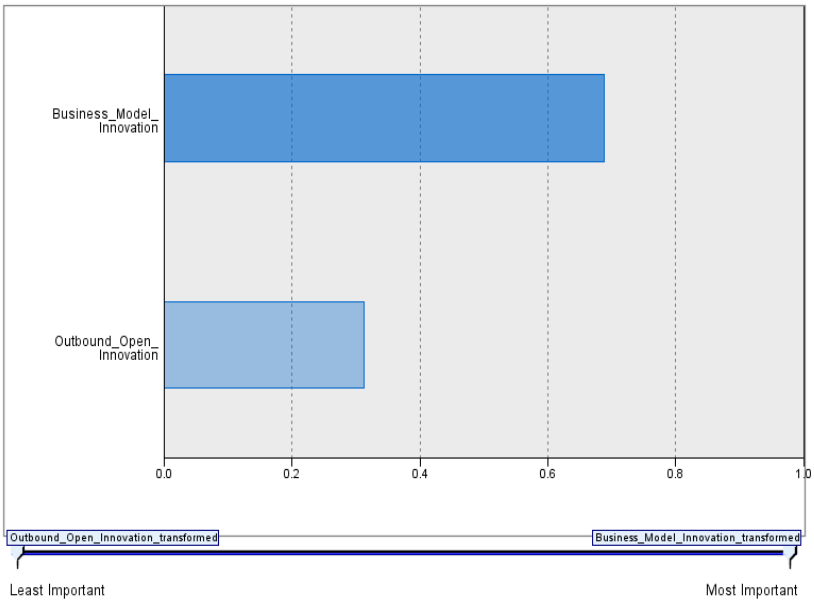

Fig. 1. Predictor Importance.

After trimming outliers the significant variables including Business Model Innovation and Outbound Open Innovation are left.

B. Predictor by Observed

Predicted has calculated the values that the model has predicted for performance. Observed values show direct values of performance as responded by sample SMEs. This scattered graph shows predicted values and observed values. The angle made by the predicted values is roughly 45 degrees shows that observed values are similar to predicted values.

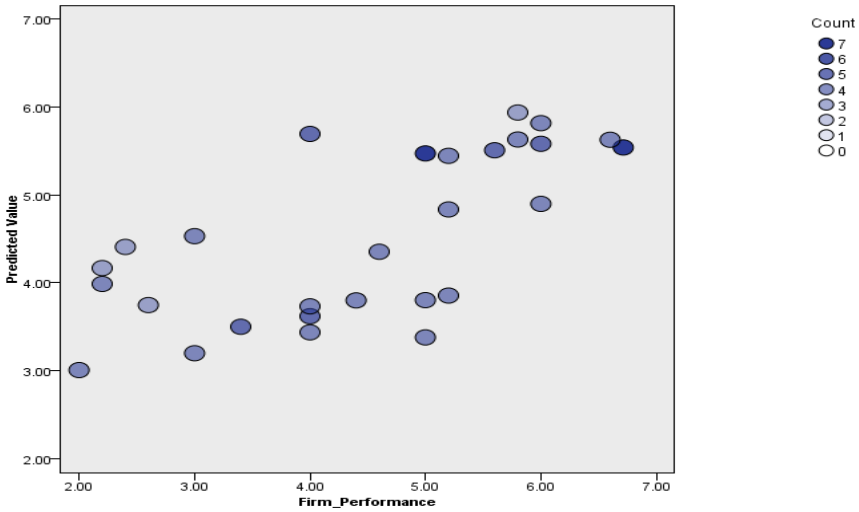

Fig. 2. Predictor by Observed.

C. Residuals

The histogram of residuals compares the distribution of the residuals to a normal distribution.

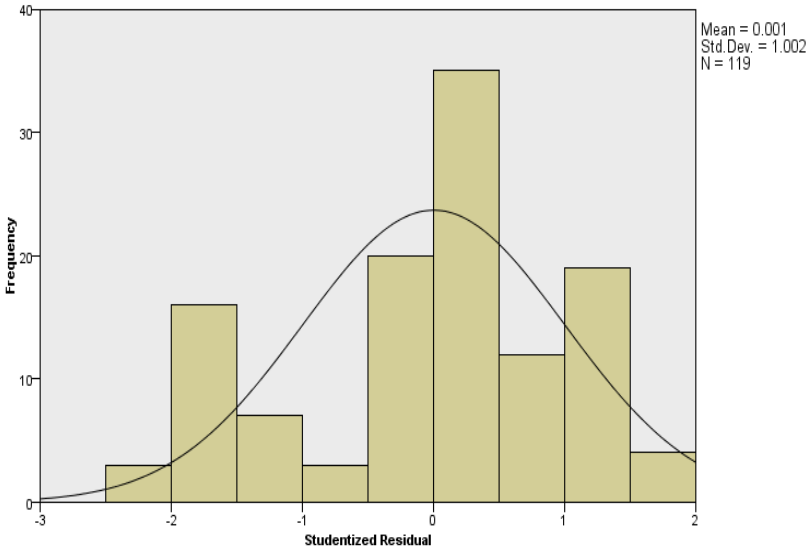

Fig. 3. Histogram showing Residuals.

D. Effects (Target Firm Performance)

The effects of the transformed variables are shown in the tables below. The significant values for given independent variables come out to be less than 0.05, showing that they have a significant relationship with the firm performance.

Table 8: Effects (Target firm performance).

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected model	104.925	2	53.462	51.635	0
Residual	117.858	116	1.016		
Corrected Total	222.783	118			

E. Coefficients (Target Firm Performance)

The coefficients gave the positive and inverse relationship of independent variables with the dependent variable, i.e. firm performance. Confidence interval shows the range of confidence limits for a particular IDV. The significant values are below 0.05, showing Business Model Innovation and Outbound Open Innovation as the IDVs having higher lower confidence limit than rest of the variables, showing that Business Model Innovation and Outbound Open Innovation have a positive significant relationship with performance of the firm.

Table 9: Coefficients (Target firm performance).

Model Term	Coefficients	Sig.	Importance
Business Model Innovation	0.493	0	0.688
Outbound Open Innovation	0.361	0.002	0.312

F. Estimated Mean Charts

Estimated means are shown for the top ten significant effects on the performance measures (FPM) of the organization. The graphical representation shows the nature of relationship between independent variables and firm performance.

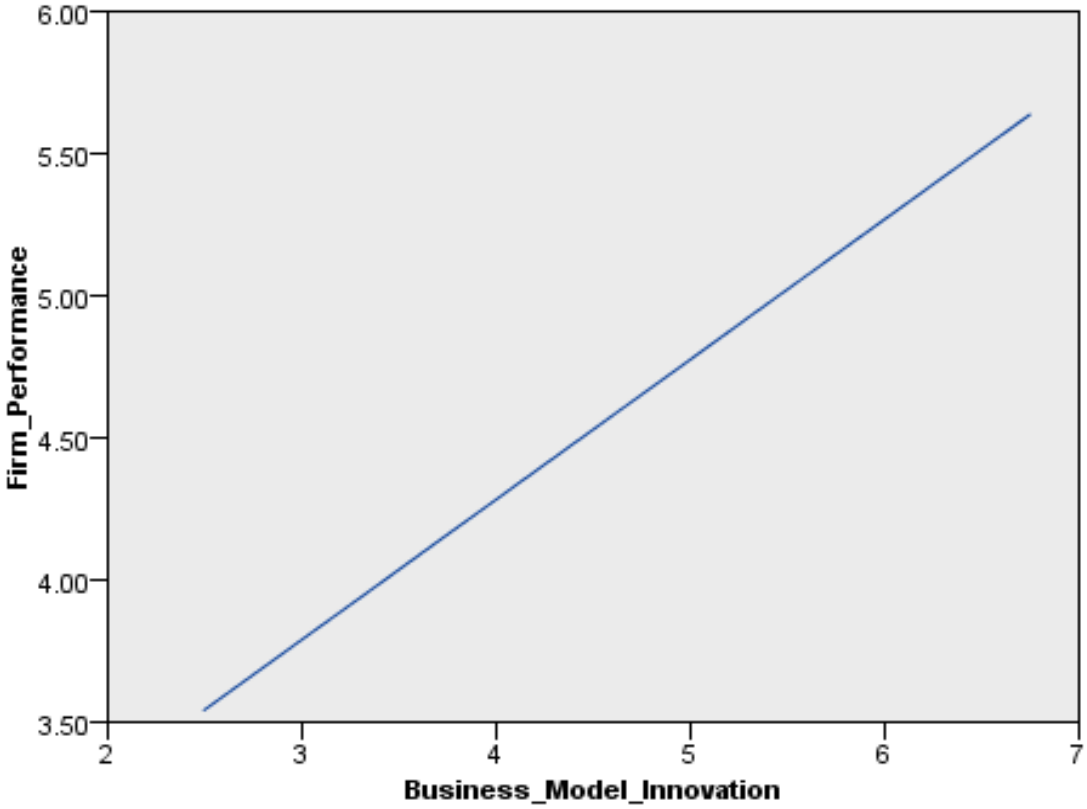

Fig. 4. Estimated mean charts between business model innovation and firm performance.

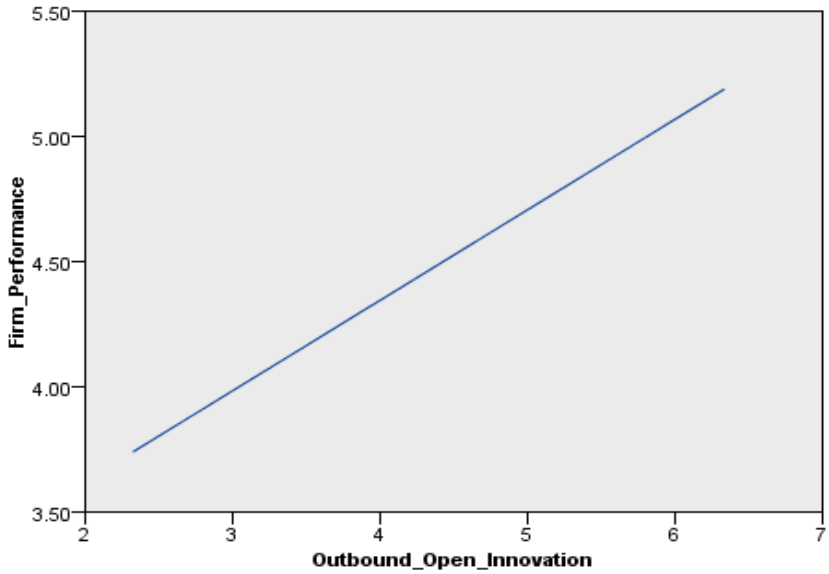

Fig. 5. Estimated mean charts between outbound open innovation and firm performance.

G. Model Building Summary

The model-building summary shows the step at which a particular IDV was rendered to be a significant one. At step two, 2 independent variables, shown in the table, were identified as significant.

Table 10: Model summary.

		Steps	
		1	2
Information Criterion		12.621	5.062
Effect	Business Model Innovation	Yes	Yes
	Outbound Open Innovation		Yes

Both business model innovation and open innovation have positive effect on firm performance. In case of open innovation outbound innovation have positive effect.

VII. CONCLUSION

Both Open innovation and Business Model Innovation have a significant positive influence on firm performance. Open innovation demonstrates that the limits for the innovation techniques for huge business are permeable. In innovation technique, enterprise extends the usage of outside imaginative innovation to decrease their R&D costs. These test outcomes are consistent with past exploratory investigation results (Chesbrough, 2003c; Chesbrough and Crowther, 2006; Jacobides and Billinger, 2006; Lichtenthaler, 2008; Lichtenthaler and Ernst, 2008; Laursen and Salter, 2006) [3,5,10,14,15,12]. Business model innovation has a significant positive influence on firm performance. Business model innovation helps tries to manufacture distinct advantages by making new business models to make quality to the customer and escape direct incensed competition. These test outcomes are unfaltering with past exploratory investigation results (Han *et al.,* 1998; Hurley and Hult, 1998; Mitchell and Coles, 2004; Pohle and Chapman, 2006) [8,9,16,20].

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