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Product Innovation and SMEs Performance in the Manufacturing Sector of Ghana

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Authors' contributions

This work was carried out in collaboration between all authors. The research work was initiated by author AO, with support from authors SKF and WAA in the area of literature reviews and the administration of the research questionnaires. Author SY supervised the entire research with ample suggestions and amendments. All authors read and approved the final manuscript.

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ABSTRACT

Small and Medium Enterprises (SMEs) are the growth engines for economic development of both developed and developing countries in the areas of job creation, contribution to Gross Domestic Product (GDP), poverty alleviation, and innovation of business ideas. As a result of this, several efforts have been made towards the improvement of their performance. Previous studies based in most advanced countries have established that in today's globalized and competitive environment, companies focusing on innovation achieve not only competitiveness, but are also able to sustain them for a longer period of time for higher performance. The aim of the study is to establish the contribution of product innovation to the performance and growth of SMEs in Ghana. Using firm level data and the structural equation model, product innovation was grouped into three (Development of new product, Introduction of new product and Improvement of existing product), whiles performance indicators were the growth in number of employees and total sales of the firm. The results indicated a positive growth path between all the three variables and the firm's

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performance with the introduction of new products having the highest, indicating that, firms can improve their performance by adopting product innovative practices with much concentration on the introduction of new products.

Keywords: Product innovation; firm performance; SMEs; firm growth; new product; improved product.

1. INTRODUCTION

Small and Medium Enterprises (SMEs) play major roles in the economic development of both developed and developing countries in terms of job creation, poverty alleviation, innovation of business ideas and contribution to Gross Domestic Product (GDP). SMEs account for over 90% of all businesses in the Sub-Saharan Africa, and create majority of employment in both developed and developing countries, and contribute about 50% to their GDP, which in the long run propels the economic growth and development of nations [1]. In view of these significant roles, several policies and programs have been rolled out by governments and other institutions to boost up the SMEs growth [2-5].

In realizing the contributions of science, technology and innovation in the development of SMEs and in the national economy, several initiatives and policies have been made by the government of Ghana in enhancing the SMEs capacity to benefit from the latest innovation programs. For instance in the year 2000, National Science and Technology Policy was approved by cabinet to help achieve and realize this goal. In 2010, the National Science and Technology Policy Document of 2000 was revised to include innovation in recognition of the importance of innovation to firms successful performance, with the aim of guiding and assisting Ghana to attain middle income status by 2020 [4].

The Ghana Shared Growth and Development Agenda (GSGDA) I and II for 2010 - 2013 and 2014 – 2017 respectively serve to guide and help Ghana to attain upper middle income country by 2020, also acknowledged the need to place more emphasis on science, technology and innovation as one of the key drivers for enhancing the competitiveness of private sector of Ghana and consequently for its economic growth [6], [7]. With the above initiatives, policies, and many others for recognizing the importance of innovation for the growth of the economy, there is little knowledge of the level of innovation activities of firms in Ghana to assist policy makers and stakeholders to come out with innovation strategies and policies for the firms to overcome the barriers limiting innovation activities of the firms to stay competitive [8-14,15].

African Science, Technology and Innovation Indicators (ASTII) initiatives seeking to provide data on innovation activities among others to fill this gap have produced 2010 and 2014 Africa Innovation Outlook as being done by European Countries in their Community Innovation Survey. However, ASTII started with firms of ten or more employees thereby cutting off a lot of micro and small businesses which account for significant portion of the SMEs [16,17].

Yet several challenges have been identified as hindrance to the desired growth, prominent among the challenges is the inability of most SMEs to innovate, making them less competitive in terms of production and cost effectiveness [18–21,22].

In 2014, Ghana poorly recorded 111 out of 144 countries in global competiveness rank [11]. Ghana was again poorly ranked 94 out of 142 countries, 96 out of 143 countries and 108 out of 141 countries in 2013, 2014, and 2015 respectively in Global Innovation Index rankings [23,24].

Ample evidence from researches carried out by [25-29] on the abysmal performance of SMEs in developing countries, established a positive correlation between non-adoption of innovation and poor performance of SMEs. Against this backdrop on the fact that, most SMEs in developing countries are not innovative inclined, confirming reasons why their productivity is low compared with their larger counterparts as well as SMEs in developed countries, where innovation is very prominent.

The rationale for this research work is to determine the effect of product innovation on the performance of SMEs to set as a benchmark to encourage local SMEs in Ghana to adopt the principles of product innovation to attain the benefits associated with innovation practices. This would be achieved by using firm level data and the structural equation model, with product innovation as independent variable. The

performance indicators as dependent variables will be the growth in number of employees and total sales of the firm. The findings would assist the SMEs to develop new innovation capabilities that would help to contribute to value creation, access to new market and improved technology and high productivity [30–34].

The rest of the paper is organized as follows: the section two focuses on empirical literature review covering development of new product, introduction of new product, improvement of existing product and the performance of firms. This is followed by section three which deals with methodology, analysis and discussion of results. Conclusion and recommendation form the last section of the paper.

2. EMPIRICAL LITERATURE REVIEW

2.1 Development of New Product and Firm's Performance

In today's competitive environment, firms that succeed will be those that develop products that satisfy customer needs better than the products of their competitors. Therefore, it is necessary that firms fully research such needs, and generate ideas and solutions that can best satisfy them. The more innovative a firm is, the greater the chances to create new product to integrate into new market, whiles expanding in the existing market [35]. Also, this has been affirmed by Ansoff Growth Model quadrant, where the introduction of new product as well as the improvement of the existing ones has been key factors for SMEs growth both in the short and long run [36-38].

This type product innovation has been classified as radical innovation [39] which involves the development of entirely new design elements such as change in a product component combined with complete new architecture for joining components. The result is a completely new product that is significantly different from the organization's existing product line. A high level of risk is associated with radical innovation projects, especially at early stages. Due to high levels of risk, the process is most of the time described as an orderly structured process. Radical innovations are confronted with uncertainties on different levels. To be successful, uncertainty (risk) must be reduced in the following dimensions: Technical uncertainty, Market uncertainty, Organizational uncertainty, and Resource uncertainty [40].

In response to the changing demand for new products [41], [42], firms have no option than to come out with new products, as a result new product development (NPD) is widely recognized as an essential property of a firm sustainability [43,44]. This is because some products value decreases as they approach the end of their life cycle and customers' demand may reduce drastically. The process involve in coming out with a new product in meeting the demand of customers is sometimes very complex, which demands the assembling of highly motivated and innovative oriented employees and management team [43,45]. Specialized skills, competencies and talents needed for the development of new products often lie (and develop) locally in the pockets of excellence around the company or even worldwide. Therefore, companies have no choice than to disperse their new product units to access such dispersed knowledge and skills [46], which will lead to the selection of right design, technology and the required output. In some instances, coming out with new product requires collaboration with outside companies and research organizations, since the parent company may not possess all the required qualities needed. The objective of coming out with new product does not only help meet the needs of targeted customers, but also provide marketplace superiority competitive advantages in the industry [47]. Empirically, Uniliver Ghana LTD, a general goods manufacturing and distributing firm, places innovation at the center stage, and as a result introduces new products frequently to meet the changing demands of its customers, making them the market leaders in several products in Ghanaian market [48]. Though UNILIVER is a large business, yet principles of product innovation inspire SMEs to strive to reach higher heights.

Evidence shows that, most SMEs in developing countries do not practice product innovation, despite the accrued advantages. No wonder the productivity of those SMEs always falls short as compared to those from advance countries [49]. New product development success is fostered by an optimized usage of R&D – marketing integration and high productivity [35]. For most firms, successful new products are the sources of their growth [50]. Several frameworks, including the product-life cycle and growth-shared matrix, postulate the need for new products that generate future profitability and prevent the obsolescence of firm's product line [51,52].

H1: The literature and empirical evidence advanced so far lead to hypothesis that, the adoption of innovation principles in new product development leads to higher firm's performance.

2.2 Introduction of New Product and Firm's Performance (Adoption and Outsourcing)

World economic recession, globalization of business environment and advances in technologies are pushing manufacturing firms to innovate to come out with new products to meet the ever changing needs of their customers, in doing so, some firms introduce new product to their businesses through outsourcing from different companies who may have technical edge in that field [53]. Again growing demands for customized product and constant pressure on cutting down production cost pushes some manufacturing firms to consider various strategic options to stay in global competitions, which includes collaborative product development process and introduction of entirely new products from elsewhere into their business. Evidence shows that, this kind of innovative strategy results in high performance of firm in the areas of sale [54], [55]. A firm may outsource some parts of a product, while internally adds some parts, or introduce the complete product straight to the market as [54], described "When firms produce some of their requirements internally and obtain some of their requirements from market, the firm can be said to be operating under a taper integration method". This process has been considered as one of the best ways to reduce transaction and greater bureaucratic costs to access diverse sources of knowledge, to integrate tacit knowledge and complementary assets, and to make its strategy flexible [55], whiles in the long run leads to higher firms' performance. In the view of [56], firms concurrently introduce new product through outsourcing and at the same time manufacture some products may only need to buy or produce a small percentage of their requirements to receive the benefits offered by the market and hierarchical structure of the organization.

Empirically, research by [57], on the effect of introduction of new product by some Japanese manufacturing industry on their performance established a U-shape in terms of return (operating profit) on sales. Specifically, firms can increase their returns on sales by selecting an integration strategy similar to non-integration or full integration, as these strategies reduce the sum of transaction costs and governance costs for created values. In supporting the idea of high performance, [58-60] through outsourcing, they were of the view that, firms reduce transactional and governance costs thereby improving revenue generation.

H2: Based on the literature and empirical findings, it is hypothesized that, the introduction of new products impact positively on firms' performance.

2.3 Improvement of Existing Product and the Performance of Firms

Innovativeness is one of the fundamental instruments of growth strategies to enter new markets, to increase the existing market share and to provide the company with a competitive edge. Motivated by the increasing competition in the global markets, and ever changing needs of local customers, firms have no options than to improve their existing products if they want to stay in the game. As a result, product innovation is now an integral part of a firm's strategy for several reasons such as to apply more productive manufacturing processes, to enhance sales performance in the market, to attract new and maintain loyal customers and as a result to gain sustainable competitive advantage. Particularly over the last twenty years, innovativeness has turned into an attractive area of study for those researchers who tried to define, categorize and investigate its performance impacts, especially due to its practical relevance [61]. Again, product innovation through value addition, helps firms to increase their market share and one step ahead their competitors which can generate various benefits in economic, preemptive, technological, and behavioral factors [62,63]. Some researchers [64-66] are of the view that, a successful implementation of product innovation (product improvement) helps firms to outperform even previously held superior competitors.

At times it becomes very difficult to produce entirely new product, whiles it maybe economic viable to improve the existing product, repackage and rebrand for an existing and new market and perform well [63,67,68].

Theoretically, incremental innovation makes small changes at one given time and is sometimes referred to as continuous improvement [39]. A simple product may be

improved (in term of better performance or lower cost) through the use of higher performance components or materials. A complex product that consists of integrated technical sub-systems can be improved by partial changes at one level of a sub-system. Incremental innovations do not involve major investments or risk. User experience and feedback is important and may predominate as a source of innovation ideas [40].

H3: Based upon the review of the above literature, we hypothesized that, the Improvement of exiting product impact positively on the performance of firms.

3. METHODOLOGY

In this study, a quantitative approach was adopted, using survey techniques to gather data from 400 SME owner managers in Ghana. Sharing same views with [69], [70], a purposive sampling technique was employed to select the most productive section of the research population to answer the research questions in more productive manner.

In-depth information was obtained from the sampled views of SME owner managers utilizing structured questionnaires pertaining to issues on product design and the performance of firms. Consequently, psychometric assumptions (normality test, linearity test, correlation) were examined to position the data to the research hypotheses. Statistical techniques for Social Sciences such as descriptive statistic (frequencies and simple percentages), Principal Component Analysis (with Factor Analysis as an extraction method), CFA and a Structural Equation Model were utilized to analyze the data obtained and to test the relationships in the specified constructs in the proposed research model. Concurrently, validity and reliability test were observed to substantiate the strength of internal consistency and discrepancies in the measurement model for improvement. Pertaining to this, convergent and discriminant validity were considered for indications of validity problems whiles Composite reliability (CR) and Cronbach's alpha were vehemently examined for internal consistency in the research indicators. Then also, a common latent factor was planted to evince issues of biasness in the measurement model formulated for the study.

The Statistical Package for the Social Sciences (SPSS) version 22, IBM AMOS, Microsoft excel and excel tool package were chiefly employed in the research analysis wherefore, generated outputs were presented with explanations provided for intuitive discussions.

3.1 Statistical Analysis and Presentation of Results

Utilizing the Microsoft Excel (2013) the data obtained was coded, screened and cleaned with particular consideration on missing data and unengaged responses. 5 cases representing (1.3%) of 382 retrieved responses had missing data while all the cases examined displayed no indication for unengaged responses (SD>0.05). Consequently, the missing data was replaced with medians and descriptive analysis of the bio-data for the research respondents was examined. Approximately 95.5%, denoting 382 responses of the 400 cases distributed for the views from SME owner managers were descriptively analyzed. It was evident that, 192 (49.0%) of the cases constituted males and 195 (51.0%) represented females with 102 (26.70%) having Senior High School (SHS) education and below, 105 (27.50%) CERT/DIP/HND, 93 (24.30%) had First Degree Education and 82 (21.50%) above First Degree Education. On the score of age, 80 (21.0%) had 25 years & below, 87 (22.80%) had 26 to 35 years, 103 (26.90%) had 36 to 45 years while respondents of ages 46 years and above constituted 112 (29.30%). The lucid preponderance of respondents with age range above 36 and 46 is in no term a prejudiced sample selection, but an indication of aging SME owner managers and entrepreneurs such that, the middle age and the youth in Ghana have been left with less possibilities and opportunities to undertake entrepreneurial activities in the country.

Following the normality of the data set, the location and variability of the research data as responded by the 387 SME owner managers were examined. Synchronously, Skewness was observed for respondents' demographics (such as age and gender) while Kurtosis was employed to examine the location and variability in the Likert-scales items. For both techniques, a threshold of ±2.00 was employed to trace potentially problematic kurtosis and skewness in the data set. The import readily displayed that, the research data did not deviate from normality as all the cases observed were approximately and normally distribute with skewness and kurtosis values less than the threshold as shown in Table 1.

Table 1. Descriptive statistics

Descriptive statistics					
N=382	**Mean**	**Std. deviation**	**Variance**	**Skewness**	**Kurtosis**
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Statistic**
Gender	1.51	.500	.250	-.053	-2.008
Age	2.74	1.348	1.816	.149	-1.218
Education	2.52	1.154	1.332	-.059	-1.437
Q1INP	2.73	.831	.691	.291	-.395
Q2INP	2.86	.894	.799	.104	-.804
Q3INP	2.72	.885	.784	.299	-.475
Q4INP	3.09	.913	.834	-.286	-.681
Q5INP	2.99	.945	.892	-.083	-.883
Q6IEP	2.40	.930	.865	.566	-.127
Q7IEP	2.40	.938	.881	.835	.193
Q8IEP	2.36	.977	.955	.706	-.090
Q9IEP	2.20	.826	.683	.811	.596
Q10IEP	2.25	.913	.834	.707	.020
Q11AIP	4.03	.709	.503	-.703	.989
Q12AIP	3.97	.702	.493	-.696	1.299
Q13AIP	3.98	.710	.504	-.598	.955
Q14AIP	3.98	.691	.477	-.597	1.135
Q15AIP	4.05	.705	.496	-.564	.844
Q16FP	3.88	.727	.528	-.839	1.762
Q17FP	3.88	.740	.547	-.626	.980
Q18FP	3.75	.765	.585	-.718	.964
Q19FP	3.87	.742	.551	-.607	.916
Q20FP	3.47	.909	.827	-.256	-.365
Int_New_Prod	3.0081	.73819	.545	-.076	-.154
Firm_Perf	3.8659	.73665	.543	-.614	.959
Imp_Exis_Prod	2.1744	.71648	.513	.674	.369
Add_Inn_Princ	3.9180	.62533	.391	-.683	1.396

Accordingly, a linearity test was executed to examine the strength of the linear relationships present in the data as compared to other relationships such as quadratic, inverse, cubic, logarithmic, compound and exponential (See Table 2). Then also, a regression graph was plotted to display unequal variability in the values of the outcome variable across variability in the values of predictor variables in the data for indication of homoskedasticity and heteroskedasticity. The analysis shows that, there is approximately equal variance in the values of the criterion variable across the values of the predictor variable as the dot plot do not extremely depart or centre along the regression fit line.

Table 2. Model summary and parameter estimates of equations in the data set

Model summary and parameter estimates of equations in the data set									
Equation	**Int_New_Prod.**			**Imp_Exis_Prod**			**Add_Inn_Princ.**		
	R square	**F**	**Sig.**	**R square**	**F**	**Sig.**	**R square**	**F**	**Sig.**
Linear	.250	126.523	.000	.133	58.206	.000	.260	133.563	.000
Logarithmic	.209	100.442	.000	.107	45.543	.000	.262	134.716	.000
Inverse	.152	68.101	.000	.080	33.016	.000	.228	111.955	.000
Quadratic	.287	76.124	.000	.173	39.680	.000	.266	68.520	.000
Cubic	.289	51.287	.000	.184	28.494	.000	.267	46.006	.000
Compound	.243	121.654	.000	.124	53.786	.000	.257	131.608	.000
Power	.221	107.556	.000	.107	45.761	.000	.267	138.767	.000
Growth	.243	121.654	.000	.124	53.786	.000	.257	131.608	.000
Exponential	.243	121.654	.000	.124	53.786	.000	.257	131.608	.000
Logistic	.243	121.654	.000	.124	53.786	.000	.257	131.608	.000

Table 3. Kaiser-Meyer-Olkin measure of sampling adequacy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.895
Bartlett's Test of Sphericity	Approx. Chi-Square	6995.194
	Degree of Freedom	190
	Probability value	0.000

Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.380	36.898	36.898	7.380	36.898	36.898	4.095	20.476	20.476
2	3.429	17.144	54.042	3.429	17.144	54.042	3.781	18.907	39.384
3	2.207	11.033	65.075	2.207	11.033	65.075	3.574	17.870	57.254
4	1.888	9.440	74.515	1.888	9.440	74.515	3.452	17.262	74.515
5	.684	3.419	77.935						
6	.613	3.065	81.000						
7	.494	2.472	83.472						
8	.450	2.252	85.724						
9	.400	2.002	87.726						
10	.375	1.876	89.603						
11	.330	1.651	91.254						
12	.302	1.511	92.765						
13	.288	1.441	94.206						
14	.263	1.317	95.523						
15	.237	1.187	96.710						
16	.215	1.076	97.786						
17	.185	.925	98.711						
18	.154	.771	99.482						
19	.099	.495	99.977						
20	.005	.023	100.000						

Extraction Method: Principal Component Analysis

3.2 Exploratory Analysis (with Factor Analysis, Orthogonal Rotation Varimax Rotation)

Based on the screened and cleaned data, an exploratory factor analysis utilizing PCA with orthogonal rotation (varimax) method and Kaiser Normalization were employed to examine the variance-covariance structure in the linear composition among items in data set. Following all assumptions, the Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was statistically significant ($p<0.001$) after the R-matrix (refer from Table 3) has verified the suitability of the data for factor analysis.

With consideration to Kaiser's criterion, 4 components were extracted with eigenvalues greater than 1 while the percentage of the total variance explained by the extracted model was evidently convincing (see Table 3, column labeled Extraction sums of squared Loadings).

A cleaned and well defined factor pattern ensued with loadings greater than .5 and .7 in most cases to evince that, approximately, the extracted variables sufficiently correlate with their corresponding items with 29 (15.0%) non-redundant residuals haven absolute values greater than .05 (see Table 4).

Succeeding to the extraction was the creation and validation of a measurement model utilizing confirmatory factor analysis (CFA) in a covariance based method. By examining the generated modification indices and the goodness fit indices, opportunities were sorted to improve or modify the measurement model as items e1 to e5 were co-varied for the AIP variable, e13 to e15 FP variable and e16, e19 & e20 for INP variable while none of the IEP items were co-varied. Sequel to that was an observed X^2 of 1370.220 with Df 909, and p-value>0.05 while the thresholds for CMIN/DF (1.177), RMR (0.031), GFI (0.956), CFI (0.996) and NFI (0.975), RMSEA (0.022) and PCLOSE (1.00) were concurrently met. Then again, the path estimates for the observed items on the latent variables were significantly different from zero, p-values<0.001 and 0.05 in most cases. Shown in Table 5 is the result for the regression weights obtained for the measurement items.

Table 4. Rotated component matrix

Rotated component matrix[a]						
	Component				MSAs	Communalities
	1	2	3	4		
Q14AIP	.894				.864[a]	.873
Q13AIP	.880				.897[a]	.850
Q12AIP	.862				.924[a]	.852
Q15AIP	.848				.940[a]	.768
Q11AIP	.836				.917[a]	.754
Q9IEP		.894			.886[a]	.831
Q10IEP		.877			.902[a]	.799
Q8IEP		.874			.903[a]	.795
Q7IEP		.816			.930[a]	.730
Q6IEP		.750			.955[a]	.627
Q17FP			.906		.778[a]	.903
Q19FP			.902		.779[a]	.901
Q16FP			.852		.973[a]	.799
Q18FP			.719		.951[a]	.570
Q20FP			.617		.952[a]	.438
Q2INP				.864	.871[a]	.800
Q3INP				.815	.915[a]	.707
Q4INP				.792	.924[a]	.676
Q5INP				.783	.907[a]	.668
Q1INP				.701	.920[a]	.564

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 6 iterations
There are 29 (15.0%) nonredundant residuals with absolute values greater than 0.05

Table 5. Regression weights for measurement items on latent variables

Regression weights for measurement items on latent variables						
Items	**Paths**	**Latent variables**	**Estimates**	**S.E.**	**C.R.**	**P**
Q14AIP	<---	Add_Inn_Princ	0.933			***
Q13AIP	<---	Add_Inn_Princ	0.908	0.028	35.381	***
Q12AIP	<---	Add_Inn_Princ	0.901	0.036	27.002	***
Q15AIP	<---	Add_Inn_Princ	0.819	0.04	22.348	***
Q11AIP	<---	Add_Inn_Princ	0.774	0.065	13.15	***
Q9IEP	<---	Imp_Exis_Prod	0.899			***
Q10IEP	<---	Imp_Exis_Prod	0.865	0.044	23.919	***
Q8IEP	<---	Imp_Exis_Prod	0.861	0.048	23.685	***
Q7IEP	<---	Imp_Exis_Prod	0.809	0.049	20.978	***
Q6IEP	<---	Imp_Exis_Prod	0.723	0.052	17.295	***
Q17FP	<---	Firm_Perf	0.997			***
Q19FP	<---	Firm_Perf	0.998	0.006	171.655	***
Q16FP	<---	Firm_Perf	0.829	0.028	28.716	***
Q18FP	<---	Firm_Perf	0.605	0.042	14.784	***
Q20FP	<---	Firm_Perf	0.466	0.056	10.258	***
Q2INP	<---	Int_New_Prod	0.87			***
Q3INP	<---	Int_New_Prod	0.785	0.05	17.815	***
Q4INP	<---	Int_New_Prod	0.759	0.052	16.992	***
Q5INP	<---	Int_New_Prod	0.792	0.054	17.936	***
Q1INP	<---	Int_New_Prod	0.679	0.049	14.78	***

*Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10*
Paths with no CR & SE are constrained to 1

Nonetheless, validity concerns were equally imperative to publish the predictive strength and the extent of consistency within the measurement items. To ascertain this assumption, convergent validity, discriminate validity and composite reliability were computed and examined. Average Variance Explained (AVEs), the Square roots of AVEs were calculated, examined and compared to all inter-factor correlations. Then also, MSVs and ASVs were computed and compared to the AVE values obtained. In all-the-round cases, potentially problematic validity concerns were not readily traceable in the measurement model as the AVE values obtained were above .50 and the diagonals estimates for variable correlations were greater than the correlation coefficients. In comparison, all the estimates computed for MSV and ASV were less than the values for AVE which goes to reinforce that, the measurement model possess distinct factors as shown in Table 6. Pertaining to the internal consistency in the measurement model, the composite reliability (CR) estimates computed goes to verify with values greater than the minimum threshold of 0.70.

3.3 Hypotheses Testing

In a structural equation modeling, the research hypotheses were tested, where regression estimates were examined and probability values were accessed to accept or nullify the alternative and the null hypotheses. To ensure consistency in the research analysis, the modification indices were generated for potential possibilities to improve the construct model. Consequently, the predictor variables were covaried to table the associations among them. It is readily discernible that, the construct model command sufficient predictive abilities having displayed an X^2 of 6.121, degree of freedom=9 with p-value of .728. The observed estimates for the goodness of fit indices cross-examined to their threshold shows CMIN/DF=0.68 (within 1 to 3), RMR=0.063 (<), GFI= 0.995 (>), AGFI=0.995 (>), NFI=0.985 (>), CFI=1.00 (>.), RMSEA=0.00 (<0.05) and PCLOSE=0.975 (>0.05).

Table 6. Validity construct

	Validity							
	CR	**AVE**	**MSV**	**ASV**	**Firm_Perf**	**Add_Inn_Princ**	**Imp_Exis_Prod**	**Int_New_Prod**
Firm_Perf	0.897	0.652	0.244	0.114	0.808			
Add_Inn_Princ	0.939	0.755	0.244	0.146	0.494	0.869		
Imp_Exis_Prod	0.919	0.695	0.172	0.093	0.222	0.242	0.834	
Int_New_Prod	0.885	0.608	0.172	0.119	0.221	0.367	0.415	0.779

Table 7. Standardized regression weights

	Standardized regression weights						
DV	**Paths**	**IV**	**Estimates**	**S.E.**	**C.R.**	**Correlation**	**P**
Firm_Perf	<---	Add_Inn_Princ	0.263	0.05	6.298	0.284	***
Firm_Perf	<---	Imp_Exis_Prod	0.16	0.026	4.108	0.187	***
Firm_Perf	<---	Int_New_Prod	0.283	0.036	6.965	0.389	***

Then again, the path estimates published in the Table 7 are the regression weights from the predictor variables on the criterion variable. Pertaining to the research hypotheses, the exhibits amply define that, the *adoption of innovation principles in new product development* (AIP), *introduction of new products* (INP) and *Improvement of existing product* (IEP) explain the variation in firm performance. Empirically, it is adduced that, 26.3% of the impact on firm performance is connected to the *adoption of innovation principles in new product development* (AIP) and 16% is attributable to *Improvement of existing product* (IEP) while *the introduction of new products* (INP) approximately explain 28.3% of variations in firm performance among SMEs. Comparison of the estimated regression weights readily display that, the variable INP has greatest effect in explaining firm performance than does AIP and IEP. Also, the AIP variable was the second important predictor of firm performance as compared to the IEP variable. Nonetheless, haven observed a probability values less than 0.001 and 0.05, the null hypotheses for H1, H2 and H3 are rejected in favor of the alternatives. The estimated p-values ($p<0.001$) amply suggests that, the research sample provides enough evidence to reject the null hypotheses of this study for the entire population.

The forgoing analysis reinforce the current wave that, the *adoption of innovation principles in new product development* (AIP), *introduction of new products* (INP) and Improvement *of existing product* (IEP) have tremendous effect on the performance status of SME firms. The Table 7 presents the standardized regression estimates, correlation coefficients and the probability values for intuitive discussions.

4. CONCLUSION AND RECOMMENDA-TION

Evidence from this study support the earlier held view that product innovation leads to improvement of firm's performance. The outcome also fit the Ansoff Growth Model quadrant, where the introduction of new product and the improvement of existing ones were the center stage for SMEs growth both in the short and long run [36,38].

The results indicated that SMEs in Ghana who adopt product innovative practices recorded a significant growth in terms of the annual turnover and the number of employees. The results revealed that, the variable INP has greatest effect in explaining firm performance than AIP and IEP. Also, the AIP variable was the second important predictor of firm performance and the IEP variable contributed the least. It is worth to point out that, majority of the firms were not practicing product innovation for several reasons including ignorance and technical know-how.

The results suggest that, SMEs in the cities and with educated entrepreneurs were adopting product innovation at the expense of those in the rural areas. Financial constraints and limited market size were the main concerns of those SMEs.

The survival of SMEs in Ghana hinges on the adoption of innovative practices if they are to compete fairly with their larger counterparts and overseas competitors.

Future research and directions should focus on the involvement of external support from the government and other support institutions for collaborations in the adoption of innovation.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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