New Product Development Activities among Small and Medium-Scale Furniture Enterprises in Ghana: A Discriminant Analysis

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Abstract

This study examined the characteristics of Ghanaian SMFEs that influence new product development (NPD) activities; determined the tactics used by the SMFEs to develop new products; and investigated the internal and external factors that can be used to differentiate between SMFEs that have the propensity to develop new products from those that do not. In general, NPD activities were found to be very low among the firms studied. Imitation was the overarching NPD tactics with firms with low technological capabilities more likely to adopting this strategy. Firm owners' educational qualifications and years in business appear to be the discriminant factors that can be used to differentiate firms that are engaged in NPD activities from those that do not, an indication that for SMFEs, NPD activities depend largely on the competencies and capabilities of the owners. The synergy between educational level and years in business appear to increase firms' propensity to use more environmentally-friendly materials for furniture production.

Key words: imitation tactics, customer-related strategies, eco-friendly furniture materials, technical support, market intelligence

1. Introduction

The furniture industry remains one of the forest sector economic activities that hold prospects for poverty alleviation in the developing countries. The industry has been described as a resource, labour-intensive and low-tech in nature that includes small and medium-scale enterprises (SMEs) and large volume producers (Kaplinsky, Memedovic, Morris, & Readman, 2003), and it is of great importance in terms of job creation and export earnings (Purnomo, Irawati, Fauzan, & Melati, 2011). In 2000, the furniture industry emerged as the largest low-tech manufacturing sector, with global trade worth USD57.4 billion (Kaplinsky et al., 2003). In 2009, the global furniture trade accounted for USD135 billion or 1% of all world trade in manufactured goods (Purnomo et al., 2011). In the state of Mississippi, the furniture industry directly accounts for nearly 30,000 jobs (Minnesota IMPLAN Group, 2006). In North Carolina, the industry employs over 75,000 people and is ranked second in the state's manufacturing sector. This constitutes about 9.7% of the total workforce in the state's manufacturing sector (Mirka, Smith, Shivers, & Taylor, 2002). In 2004, the Polish furniture industry accounted for over 100,000 jobs (Adamovicz & Wiktorski, 2006).

Developed economies such as Italy, Germany, France, UK, Canada and USA have enjoyed their fair share in the manufacturing and export of furniture (UNECE/FAO, 2009). However, on account of the labour-intensive nature of the furniture industry (Purnomo et al., 2011, UNECE/FAO 2009, Kaplinsky et al., 2003), furniture producers are increasingly re-locating their firms in developing countries where labour cost is presumably relatively low (UNECE/FAO 2009). This is evidenced by a decline of US domestic wood household furniture production with the corresponding surge in imported wood household furniture (Lihara, Buehlmann, & Graf, 2012).

It is therefore no surprise that developing economies such as China, Poland, Indonesia, Malaysia, Mexico and Brazil have leapfrogged into both manufacturing and exports of furniture past their Western European and North American counterparts. In 2008, the total value of China's furniture exports was USD27.6 billion compared to USD5.8 billion and USD 5.2 billion for Germany and Italy, respectively (UNECE, 2010). Malaysia's furniture industry contributed USD1.7 billion in exports earnings in 2004 (Ratnasingam & Ioras, 2009) and this increased to USD3.5 billion in 2008 in spite of the economic downturn in the latter part of the year (MPIC 2009). In the Japara District of Central Java Malaysia, alone, furniture exports valued at USD 120 million in 2009 (Purnomo et al., 2011). The Polish furniture industry has experienced a dramatic growth in exports, increasing its export earnings from USD147 million in 1989 to USD4.57 billion in 2004 (Adamovicz & Wiktorski, 2006) and USD4.6 billion in 2008 (UNECE, 2010). The success stories of these developing economies in their effort to increase furniture exports have been encouraging, suggesting that there are huge prospects for other developing countries if their furniture sectors are nurtured and developed.

One area that holds promise for Ghana is the timber industry. It is the fourth foreign exchange earner (11%) after minerals (36%), cocoa (35%) and tourism (12%) and accounts for about 6% of the Gross Domestic Product. About 2.5 million people depend on the industry for their livelihoods. The contribution of the industry to export earnings in 2009 and 2010 stood at USD192 million and USD190 million, respectively (GFC, 2010). Despite this modest achievement, Ghana still lags behind in terms of export growth. For example, Ghana's export growth in the past decades has been very marginal (28.6%) compared to 1300% and 131% export growths for Korea and Malaysia, respectively (Korea Development Institute, 2008). In order to give some impetus to the wood industry, the government has since 1994, initiated a number of forest sector policy reforms aimed at enhancing the production and export of added value wood products (Awuah-Seiwaah, 2010). The policies culminated in a battery of interventions. Notable amongst them are: (1) the imposition of levies ranging from 15-30% and 10-15% of the F.O.B. on export of logs and air-dried lumber, respectively; (2) the establishment of the Wood Industries Training Centre (WITC) in 1994 to provide technical and managerial training, consultancy, extension and appropriate technology transfer services to the wood processing centre; (3) the ban of log export in 1995 to allow the timber firms focus on the manufacture and export of added value products; (4) exporters of value added wood products using lesser-used timber species enjoyed a higher refund of 2% of the F.O.B than those produced from the traditional primary species (1%); (5) the establishment of Kumasi Wood Village in 1998 to transform the wood processing sector from manufacturers of simple wood products to high quality wood products through communal use of available facilities and resources (Awuah-Seiwaah, 2010).

While previous researchers focused on general issues relating to characteristics, contribution of SMEs to the economic development and constraints to SMEs development in Ghana (Abor & Quartey, 2010), effect of regulatory measures on the performance of SMEs in Ghana, an appraisal of SMEs in Ghana (Korea Development Institute, 2008), the importance of SMEs to economic development and poverty alleviation in Ghana and employment generation and SMEs development (Kuffour, 2008), the extent to which those interventions have shaped the small and medium-scale furniture enterprises (SMFEs) in terms of their capacity to develop new products has not received adequate attention. On the global scale, much of the research on new product development (NPD) has thus far focused on large-scale enterprises (e.g. Hansen, 2006) while NPD studies on SMFEs are limited to specific regions (e.g. Boon-Kwee & Thiruchelvam, 2012; Purnomo et al., 2011; Ratnasingam & Ioras, 2009).

The purpose of this study was threefold. First, we sought to examine the characteristics of SMFEs in Ghana that influence NPD activities. This was accomplished by the use statistical correlational measures such as Spearman's correlation, Chi-square, Gamma and Cramer's V. The second purpose was to determine the tactics used by the SMFEs to develop new products while the last purpose was to investigate the internal and external factors of SMFEs that can be used to differentiate between furniture enterprises that have the propensity to develop new products from those that do not. These were achieved by the application of independent samples T test, discriminant analysis (DA) and multivariate analysis of variance (MANOVA). This study has theoretical and policy implications. First, the findings can be used to validate the findings of previous studies on the subject carried out elsewhere. Second, the findings will afford policy makers the opportunity to re-examine the current forest sector reform policies and take informed decisions that could bolster the Ghanaian SMFEs' capacity to engage in NPD activities.

2. Theoretical perspective

Two major theories that are related to the study are the resource-based theory of the firm (RBT) and the concept of shared-value. The thrust of RBT of the firm is that a firm is considered as a bundle of resources, rather than products, and the firm has the option to put the resources into a wide variety of applications (Danneels & Kleinschmidt, 2001; Wernerfelt, 1995). The concept of shared-value, on the other hand, draws its strength from the close-knitted association between firm, employees and customers. It is based on the axiom that employees and customers are an integral part of an organization and innovation can be achieved through their active participation (Porter & Kramer, 2011). In the following section, the two areas are briefly discussed. We began the theoretical framework by initially reviewing literature on the socio-economic importance of small and medium scale enterprises to provide a justification for the study.

1. The global forest products industry is experiencing difficult and challenging times (Hansen & Juslin, 2006). New product development (NPD) and innovation have been identified as strategies that can be applied to bolster a firm's competitive advantage (Brown & Eisenhardt, 1995; Danneels & Kleinschmidt, 2001; Olson & Bakke, 2001), increase a firm's corporate performance (de Brentani, 2001; Han, Kim, & Srivastava, 1998), and increase a firm's opportunity to grow and expand into new areas (Danneels & Kleinschmidt, 2001). In contrast to earlier business strategies that aimed at cost saving and improved quality, today's firm's competitive advantage at the marketplace lies in its ability to create and develop new products (OECD, 2009). Economic research has identified that innovation is inextricably linked to economic growth, competitiveness and employment (Rametsteiner & Weiss, 2006). In order to survive global competition, it is therefore indispensable that the forest products industry step up its innovation activities (Stendahl, 2009). It is therefore imperative to understand the attributes of a firm that is successful at engaging in NPD (Bull & Ferguson, 2006). Despite the numerous merits associated with NPD, very little research has been conducted that addresses NPD issues in forest products industry (Bull & Ferguson, 2006). As a natural resource-based sector that has the potential for generating employment for both rural and urban populace, forest products industry becomes an obvious sector where the contribution of innovation and NPD to its sustainable development can be explored (Kubeczko, Rametsteiner, & Weiss, 2006). There are compelling reasons why NPD in SMEs should merit attention. On account of the labour intensive nature of SMEs, they have greater potential for creating more job opportunities (Abor & Quartey, 2010; Chingunta, 2002) than the large firms. They also play a key role in social stability and general economic health of a nation (Islam, Khan, Obaidullah, & Syed Alam, 2011). SMEs have been described as a key player in modern economy (Utsch, Rauch, Roffuss, & Frese, 1999), capable of providing economic empowerment and dynamism in a rapidly globalised world (Chigunta, 2002). They are considered fertile sources of new ideas and products, efficient and prolific job creators, seeds of big business and leading sources of innovation (West & Sinclair, 1992). The growing interest in SMEs is consistent with the new paradigm shift in development strategies in most countries toward a more decentralized approach. According to Han et al. (1998) SMEs are expected to grow and expand so that they can create job opportunities for the youth and contribute meaningfully to the rural economy.

2. A firm's competitive advantage is driven by both internal and external factors. The internal factors are collectively captured under the resource-based theory (RBT) which places emphasis on decisions and competencies emanating from a firm rather than its environment (Hoskisson, Hill, Wan, & Yin, 1999). The external factors, on the other hand, are factors beyond the control of the entrepreneur (Rogoff, Lee, & Suh, 2004). Thus, a firm's ability to excel in its new product development efforts rests not only with the core competencies it possesses, but its ability to integrate environmental issues in their production processes is key. For SMFEs, because firm owners are at the centre of all activities, we followed the interpretation of firms' internal factors advanced by Rogoff et al. (2004) as 'the characteristics of the owner or entrepreneur and the firm'. Thus, issues such as the educational qualifications of firm owners, their ages, firm owners' ability to solicit ideas from employees and customers and integrate them into the production processes become crucial to a successful new product development. In the industrial era, business strategies were mainly company-centred and consumers were at the periphery of all business activities. Earlier business thinking has been that consumers come into the new product development equation in the latter stages of product development. The 21st century business strategy has, however, placed the individual consumer at the centre of innovation process (OECD, 2009).

The shared-value theory (SVT) proposes a nexus between firm's innovation and firm's ability to integrate consumers' ideas into the production process (Porter & Kramer, 2011). Consumers' concerns are at the heart of firms' activities and product innovation is achieved through the shared views between firms and consumers. Ideas gleaned from consumers become a valuable source of information that could be used to either initiate a new product or make modifications to an existing product. The concept of bringing consumers to the centre stage in product design is to serve their interests and needs. As consumers have become more diverse (ITTO, 2010) and more environmentally conscious, firms that are receptive to consumers' ideas have greater propensity to produce a wide range of products, including products from eco-friendly materials. This statement is given credence by a study that suggests that 75% of consumers are in favour of environmentally-friendly products (Saad, 2006). We propose a "firm-consumer-technology-innovation" concept where healthy interactions between "the firm" and "the consumer" would lead to product innovation while technology serves as NPD enabler (OECD, 2009). As shown in Figure 1, NPD activities are optimized when there is a synergy between the firms' resources, consumers and technology.

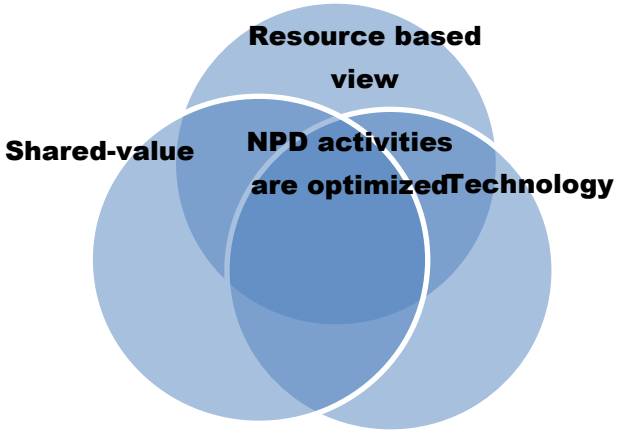

Fig 1 Conceptual Framework

3. Methods

In discussing NPD issues among SMFEs, we needed to contextualize what constitute a new product. What qualifies a product to be new has been a topic of discussion among researchers (Stendahl, 2009; Garcia & Calantone, 2002). For a product to be considered new and therefore qualified as an innovative product there should be some "newness" or improvement with respect to its characteristics or intended uses in the eye of the beholder (Stendahl, 2009; Garcia & Calantone, 2002). While majority of research takes a firm perspective towards newness (Stendahl, 2009; Garcia & Calantone, 2002), others look at it differently: new to the world, new to the adopting unit, new to the industry, new to the market, and new to the consumer. In this study since the participants are the firm owners, a new product is viewed in the perspective of the participating firms.

3.1 Participants

A sample size of 300 small and medium-scale furniture firms, of which 220 eventually participated in the study (73.3% response rate) were drawn from firms located in three major cities of Ghana- Accra, Kumasi and Sekondi-Takoradi. SMFE participants were selected from these three cities because they are home to majority of SMFEs in Ghana. Key informants for our data collection were either firm owners or their representatives. These informants were selected as the study was limited to internal factors that influence SMFEs success in NPD (Rogoff et al., 2004). Additionally, SMFEs owners are often responsible for managing their firms' activities and therefore have experience and insight into NPD issues.

3.2 Instrument for data collection

Questionnaire was used to solicit information from the participants.

Participants used a five-point Likert scale ranging from 1=totally disagree to 5=totally agree to rate items which comprised the following four major new product development activities in the wood industry: material innovation, process innovation, product innovation, and market innovation (OECD, 2009; Hansen, 2006; Kubeczko et al., 2006). In order to discriminate between SMFEs that have the propensity to develop new products from those that do not, the participants were also asked to indicate whether they had developed at least one new product in the last ten years. Other questions included in the questionnaire were the demographics (age, educational background, number of years in business) of the participants and firm characteristics (e.g. number of employees, type of employment).In order to increase the internal and content validity of the constructs used to measure NPD, we followed the procedure recommended by Robson (2011) to develop the questionnaire. First, an initial draft of the questionnaire was tested informally using marketing specialists in forest products. Based on the feedback, a few items were revised to improve better comprehension. The revised draft questionnaire was then pre-tested for construction, content validity, wording, format, and question flow through on-site in-depth interviews with twenty small and medium-scale furniture owners whose firms are located in the Kumasi Metropolis.

3.3 Administration of questionnaire

A self-administered interview-based survey questionnaire was adopted for two reasons: First, to allow for clarification of questions that might not be well-understood by the participants and second, to increase participation and eventual increase of the response rate (Robson 2011).

In order to minimize the effect of interview bias on the participants' responses, we ensured that the participants were given enough time and space to reflect on each question item before providing their own responses. Furthermore, we encouraged the participants to consult records that might help them provide accurate responses to the questions (Cohen, Manion, & Morrison, 2011). Each questionnaire sample contained a personalized cover letter, explaining the purpose of the study, and assuring them that information given would be treated with utmost confidentiality. Additionally, we informed them of our readiness to furnish them with the executive summary of the study, if requested.

3.4 Data Analysis

The data analysis protocol comprised four major steps. First, we used the Cronbach's alpha (α) to evaluate the internal consistency of the multi-scale items. Items with α=0.75 or higher are considered high in consistency (Hinton, Brownlow, McMurray & Cozens, 2004). The overall alpha for our data was 0.88 with the inter-item alpha ranging from 0.85 to 0.89, an indication of high internal consistency of the data (Table 2). Second, Cramer's *V* and Gamma statistics were used to examine the associations between the firms' internal factors and the NPD activities (Table 1). Unlike Chi-square measures of association, these statistics provide the strength of associations that makes them more useful (Healey, 2012). Third, correlation matrix was used to examine how the multi-scale items correlate with each other while an independent samples t-test was carried out to identify variables that can be used to differentiate between active and non-active NPD firms. Finally, a discriminant analysis was used to develop a model that best discriminates SMFEs that have the propensity to develop new products from those that do not, while a two-way multivariate analysis of variance (MANOVA) was carried out to examine the effect of firms' internal factors on NPD activities. In this study, only a significance level of $p < 0.05$ is reported.

3. Results

3.1 Characteristics small and medium scale furniture firms and firms' propensity to develop new products

In all, we surveyed 220 furniture firms, most of whom (65.9%) have either never developed any new product or developed only one new product in the last ten years. About one-fifth (20.9%) have developed two or three new products while only 13.2% have developed at least four new products in the last ten years. With the exception of age, new product development activities among the furniture firms appear to differ significantly in the educational level of firm owners, the number of years the firms have been in business, the number of employees engaged by the firms, and the type of employment offered by the firms (Table 1). Most (83%) of the furniture firm owners aged between 31 and 50 years while a few (8%) were 30 years or younger.

In terms of the educational background of the firm owners, the business is almost exclusively dominated by owners who have received non-tertiary education as majority (91%) had attained basic, secondary or technical education. Firms whose owners had received tertiary education are more likely to engage in new product development activities (Gamma=0.595, p<0.01) as three-fourth of them (75%) have developed at least four new products in the last ten years (Table 1). Only few of the firms with their owners with lower educational qualifications (6% basic and 11% secondary certificate holders) have developed such number of new products during the same period. We requested the firm owners to indicate the number of years their firms had been in business, as we wanted to know if new product development activities in the firms vary in that respect. Most (80%) have been in the furniture business for at least six years. New entrants (five years or less) constitute 20% of the total firms surveyed and they are less likely to engage in the development of new products than the older firms (Gamma=0.531, p<0.01).

The smallness of SMFEs was evident when we requested the firm owners to indicate the number of employees they engage. The distribution of employees was found to be positively skewed with majority of the firms (82%) engaging at most fifteen employees. The propensity of the firms to engage in NPD activities was positively associated with the size of the firms (Gamma=0.435, p=0.01). We identified apprenticeship, temporary and permanent employment as the three forms employment offered by SMFEs.

Apprenticeship (49%) remains the most preferred form of employment offered by SMFEs, followed by permanent employment (45%). Apprenticeship was more popular with relatively young SMFEs while permanent employment was the most preferred form of employment offered by older firms (Chi-square=36.304, p<0.001). It is worth noting that SMFEs that engage permanent employees appear to be more active in NPD activities than those that engage temporary employees (Cramer's *V*= 235, p<0.01).

Table 1: Profile of small and medium-scale furniture firms (%)

Variables	Product developed in the last ten years				Total
	0-1	2-3	4-5	≥6	
Age					
<20	100	0	0	0	1
20-30	40	47	13	0	7
31-40	66	18	16	0	28
41-50	72	19	8	1	55
51-60	53	27	20	0	7
>60	0	25	50	25	2
Educational level					
Basic	80	14	6	0	51
Secondary/Technical	58	31	11	0	40
Tertiary	24	14	52	10	9
Years in Business					
<1	100	0	0	0	3
1-5	78	16	6	0	17
6-10	75	19	6	0	47
>10	44	27	26	3	33
Employees					
1-5	66	26	8	0	15
6-10	81	15	4	0	42
11-15	76	15	9	0	25
16-20	33	50	17	0	6
21-25	14	43	43	0	3
26-30	17	33	50	0	3
>30	7	29	50	14	6
Type of employment					
Apprenticeship	81	14	5	0	49
Temporary	50	36	14	0	6
Permanent	53	25	22	0	45

Statistics: Age: Gamma=-0.017, p>0.05; Educational level: Gamma=0.595, p<0.01: Years in business: Gamma=0.531, p<0.01; Employees: Gamma=0.435, p<0.01; Type of employment: Cramer's *V*=0.235, p<0.01.

3.2 Tactics used by SMFEs to develop new products

We used thirteen variables to measure the level of NPD activities by the SMFEs using a five-point Likert scale (1=totally disagree; 5=totally agree) (Table 2). It was evident that NPD activities among SMFEs were generally low as almost all the constructs had a mean value of less than the mid-point average of three. Even though "imitation" was found to be the most frequent tactics adopted by SMFEs (mean= 3.85), weak correlations were found between it and concept development (0.13; $p>0.05$), prototype testing (-0.08; $p>0.05$), clients' culture (0.03; $p>0.05$), customer's ideas (0.12; $p<0.01$), customer's taste (0.11; $p>0.05$), and computer aided design (-.0.04; $p>0.05$). As we wanted to investigate the measures or tactics used by SMFEs in order to engage in NPD activities, we requested the firm owners to indicate if they had developed at least a new product in the last ten years. We then compared the mean tactics between these two categories using a t-test (Table 3).

Table 2. Correlation Matrix, Means and Reliability Measures

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Concept development													
2. Prototype testing	-.02												
3. Customers' culture	.63[b]	.29[b]											
4. Customers' ideas	.59[b]	.07	.44[b]										
5. Customers' taste	.51[b]	.34[b]	.58[b]	.53[b]									
6. Imitation	.13[a]	-.08	.03	.12[a]	.11								
7. Adequate technology	.59[b]	.06	.49[b]	.57[b]	.44[b]	.15[a]							
8. Computer Aided process	.16	.03	.19[a]	.20[b]	.23[b]	-.04	.23[b]						
9.Technical assessment	.54[b]	.04	.39[b]	.46[b]	.37[b]	.35[b]	.58[b]	.20[b]					
10.Efficient machines	.57[b]	.12[a]	.48[b]	.50[b]	.44[b]	.27[b]	.60[b]	.08	.59[b]				
11.Customised machines	.54[b]	.17[a]	.53[b]	.47[b]	.49[b]	.17[a]	.60[b]	.24[b]	.57[b]	.68[b]			
12. NTFP materials	.49[b]	.07	.47[b]	.45[b]	.34[b]	.27[b]	.44[b]	.02	.53[b]	.53[b]	.52[b]		
13. Employees' input	.60	.24	.64	.68	.53	.13	.50	.18	.48	.53	.54	.54	
Mean	2.61	2.79	2.72	2.83	2.79	3.85	2.65	1.94	2.48	3.01	2.85	2.99	3.19
SD	1.02	1.12	.99	.85	.88	.90	1.08	.80	.99	1.15	1.15	1.12	1.02
Coefficient Alpha	.86	.89	.86	.86	.86	.88	.85	.88	.86	.85	.85	.86	.87

Significant level (two-tailed): [a]$p<0.05$; [b]$p<0.01$; scale: 1=totally disagree, 5=totally agree

The disaggregation of the data showed significant differences for ten out of thirteen tactics. It is also worthy of note that ten out of twelve mean ratings of the tactics reported by the firms that have engaged in NPD activities in the last ten years were in positive territory.

The first group of tactics most frequently adopted were: *imitating from other furniture firms*; *the use of highly efficient machines and equipment*.

The second group of moderately used tactics included: *the use of eco-friendly materials to develop new products*; *customized machines*; *concept development*; *adequate technology to fully utilize raw materials*; *ideas from customers*.

The third group of tactics that were found to be less frequently used by the firms comprised; *integration of the culture of customers in product design*; *research into customers' taste*; *technical assessment of machines*.

Table 3. Mean of the responses to NPD constructs

Variable	This firm has developed new product in the last ten years		t-value
	Yes	No	
1.Concept development is undertaken by this firm	3.46	2.13	9.671[a]
2.Prototype testing is done by this firm	2.70	2.84	0.732
3. In this firm, the culture of customers is taken into consideration when designing new products.	3.28	2.40	6.918[a]
4. In this firm, customer's ideas are taken into consideration when designing a new product.	3.42	2.49	8.313[a]
5. In this firm, research into customer's taste is done before designing a new product.	3.21	2.54	5.144[a]
6. This firm is constantly imitating from other furniture firms in order to improve on what we do	4.02	3.75	2.204[b]
7.This firm has adequate technology to fully utilize its raw materials	3.45	2.19	9.092[a]
8This firm uses computer-aided manufacturing process	2.09	1.85	1.943
9.Technical assessment of the machinery is done to determine their efficiency levels	3.18	2.08	8.030[a]
10.Machines and equipment used by this firm are highly efficient	3.72	2.60	7.825[a]
11.Customized machines are used by this firm	3.56	2.44	7.378[a]
12.This firm uses NTFMs (cane, rattan & bamboo)	3.65	2.61	7.496[a]
13. This firm uses employees input in developing new products	3.85	2.81	9.216[a]

[a]$p<0.01$; [b]$p<0.05$

3.3 Discriminant Analysis

Following the results of the t-test, a discriminant analysis was carried out to derive a linear combination of the independent variables that discriminate best between the SMFEs that have the propensity to engage in NPD activities from those that do not (Table 4). We used twelve predictors to estimate a discriminant function that will maximize the differences between the two groups. All predictors accounted for 51.6% of between group variability (Wilk's Lambda=0.484, χ^2=155.804; sig.=0.001). Even though the structure matrix showed higher discriminant loadings (0.787 to 0.400) for ten of the sixteen predictors, only six predictors were extracted as the most discriminating variables between the two groups (Table 4).

Table 4- Summary of Canonical Discriminant Function

Predictor variables	Structure matrix	Unstandardised coefficients
Concept development	.866	.748
Adequate Technology	.682	.335
NTFMs	.494	.203
Highest education	.459	.335
Years in Business	.327	.376
Constant		-4.405
	Box's M=229.9; F=10.591; df1=21; df2=1.27E5; sig=0.001	
	Eigenvalue=1.064; Canonical correlation=0.718	
	Wilk's Lambda=0.484; χ^2=155.804; sig.=0.001	

The results in Table 4 give the following estimated discriminate function:

D= -4.405 + 0.748 CONCEPT DEVELOPMENT + 0.335 ADEQUATE TECHNOLOGY + 0.203 NTFMs + 0.335 EDUCATIONAL LEVEL + 0.376 YEARS IN BUSINESS

"Concept development" (0.748) appears to be most discriminating variable while the least appears to be "NTFMs" (0.203). The hit ratio, which provides the overall percentages of cases that were correctly classified by the discriminant function, was 85.5%, an indication of high prediction accuracy by the function. Based on Proportional Chance Criterion (PCC), the classification accuracy of 85.5% exceeded the proportional chance for this case ($C_{prop}=0.64^2 + 0.36^2 =0.54$ by approximately 32%.

3.4 Two-Way MANOVA

A two-way MANOVA was used to further examine the combined effect of firm owners' characteristics (educational background and years in business) on SMFEs' ability to engage in NPD activities. Following the results of the discriminant analysis, we used firm owners' educational level and years in business as independent variables and "concept development", "adequate technology", and "NTFMs" as dependent variables (Table 5). Only one of the four multivariate statistics was significant at the 5% probability level for educational level, years in business and the interaction between the independent variables (educational level * years in business).

Table 5-Two-Way MANOVA using highest education and years in business as independent variables

Effect		Value	F-value	Hypothesis *df*	Error *df*	significance
Intercept	Pillar Trace	0.809	217.8	3.000	206.000	0.000
	Wilk's Lambda	0.191	217.8	3.000	206.000	0.000
	Hoteling's Trace	4.230	217.8	3.000	206.000	0.000
	Roy's Largest Root	4.230	217.8	4.000	206.000	0.000
Educational Level	Pillar Trace	0.088	2.377	8.000	414.000	0.066
	Wilk's Lambda	0.912	2.420	8.000	412.000	0.064
	Hoteling's Trace	0.096	2.462	8.000	410.000	0.061
	Roy's Largest Root	0.095	4.924	4.000	207.000	0.008
Years in Business	Pillar Trace	0.076	1.356	12.000	624.000	0.183
	Wilk's Lambda	0.925	1.360	12.000	545.316	0.181
	Hoteling's Trace	0.080	1.363	12.000	614.000	0.179
	Roy's Largest Root	0.060	3.136	4.000	208.000	0.007
Highest education*Years in business	Pillar Trace	0.108	1.160	20.000	836.000	0.283
	Wilk's Lambda	0.895	1.165	20.000	684.175	0.278
	Hoteling's Trace	0.114	1.170	20.000	818.000	0.274
	Roy's Largest Root	0.079	3.299	5.000	209.000	0.008

We found significant effects of educational level on concept development, (F2, 209) =5.546; p=0.001, and adequate technology (F2, 209) = 3.541; p=0.031, but no significant effect was detected for NTFMs (Table 6). Years in business and the interaction between educational level and years in business had significant effects on adequate technology and NTFMs but not for concept development. Despite the usefulness of model as indicated in the significance levels of the corrected model, the independent variables (educational level of firm owners and the years firm owners have been in business) accounted for only 15.9%, 22.8%, and 13.3% of the variation in concept development, adequate technology, and NTFMs, respectively (Table 6).

Table 6-Two-Way MANOVA Test of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Concept development[a]	36.237	10	3.624	3.946	0.000
	Adequate technology[b]	57.872	10	5.787	6.156	0.000
	NTFMs[c]	36.591	10	3.659	3.195	0.001
Intercept	Concept development	303.313	1	302.313	330.303	0.000
	Adequate technology	307.188	1	307.188	326.774	0.000
	NTFMs	344.242	1	344.242	300.541	0.000
Highest Education	Concept development	10.186	2	5.093	5.546	0.004
	Adequate technology	6.657	2	3.329	3.541	0.031
	NTFMs	1.499	2	0.749	0.654	0.521
Years in business	Concept development	2.215	3	0.738	0.804	0.493
	Adequate technology	8.670	3	2.890	3.074	0.029
	NTFMs	7.437	3	2.479	2.164	0.093
Highest education*Years in Business	Concept development	3.834	5	0.767	0.835	0.526
	Adequate technology	9.853	5	1.971	2.096	0.067
	NTFMs	12.783	5	2.557	2.232	0.050

a R^2 =0.159; b R^2 =0.228; c R^2 =0.133

4.0 Discussion

New product development activities among the surveyed firms were, in general, low as majority (65.7%) had either never developed or developed only one product in the last ten years. Initial findings suggest that internal factors such as the number of years a firm has been in business, the educational level of a firm's owner, firm size, and type of employment play paramount roles in shaping firms' NPD activities. The length of time a firm has been in business increases its propensity to actively engage in NPD in the sense that older firms have accumulated experience over the years in terms of material selection, technological adoption and adaption, and customer relations. The long-standing relationship with customers makes them better understand customers' concerns and as a result they are able to address them better than new entrants. The result is increased firm-customer trust and confidence and thus culminating in building social capital that could lead to customers being more open and therefore willing to contribute ideas to new product development efforts. Firm owners with higher level of education are expected to have competitive edge over their counterparts with lower level of education in terms of core competencies in entrepreneurship (Charney & Libecap, 2000).

Firm size reflects how large a firm in employment terms (Islam et al., 2011). Šálka, Longauer, and Lacko (2006) discovered that innovation correlates positively with holding size and scale of operation in forest enterprise. Large firm size reflects assembly of large body of knowledge, skills, ideas and healthy competition among the employees that could positively affects NPD activities. The effect of employment type on NPD could be attributed to different levels of commitment towards firms' corporate strategic goals. While apprentices may be integrated into the workforce of a firm and may be assigned specific roles in the production chain, they are given only a paltry sum of money on daily, weekly, or monthly basis as a form of reward. The lack of realistic monetary reward could wane their motivation and commitment to work. Using apprentices as a form of workforce by younger SMFEs can therefore be considered as a "survival strategy" to keep the cost of production low at the expense of innovation and NPD. Imitation emerged as the most frequently used NPD tactics by SMFEs in Ghana.

In its broad sense, imitation may include direct copying by studying a physical product, and the use of catalogue to copy designs. Contrary to expectation, imitation tactics was found to be common among firm with their owners with higher educational qualifications (Spearman rho=0.128; p=0.029). The adoption of this tactics, however, does not depend on the number of years a firm has been in operation (Spearman rho=0.060; p=0.189), suggesting that both old firms and new entrants adopt imitation tactics in their NPD efforts. Despite its widespread adoption by the Ghanaian SMFEs, imitation as a strategy has not provided the needed impetus for the firms to actively engage in developing new products. This finding seems to buttress the view that compared to imitation tactics, firms that use other innovation tactics have a greater propensity to succeed in NPD (Zheng Zhou, 2006). Low correlations between imitation tactics and concept development (r_s=0.13), prototype testing (r_s=-0.08), adequate technology (r_s=0.15), and computer aided process (r_s=-0.04) suggest that firms with low technological capabilities are more inclined to using imitation tactics than those with well-established technological base. Imitation tactics is seen as a cost cutting strategy by firms because imitators need not to invest much on research (Schnaars, 1994).

Another significant finding emerged from the study was the weak correlations between imitation and customer-oriented NPD tactics such as using customer's culture (r_s=0.03), customer's ideas (r_s=12) and customer's taste (r_s=0.11) to develop new products. Customer involvement in the development of new products has been identified as a key paradigm shift in modern business (OECD, 2009). Despite the evidence that suggests that customers are frequently an excellent source for new product ideas (Olson & Bakke, 2001), its adoption by firms has met with considerable challenges. Lack of desire and patience have been noted as barriers to involving customers in product development activities (Cristiano, Liker, & White, 2000). Recent study on managerial competence and non-performance of small firms in Ghana however suggests that firms' executives have developed the culture of soliciting ideas from others, have the requisite competences to create new products and procedures (Sanda, Sackey, & Fältholm, 2011). Our empirical results, however, did not support this finding, at least for the small-scale furniture enterprises that were surveyed. The use of customers' culture, ideas, and taste in developing new products appears to be not frequently adopted by SMFEs firm owners.

In this paper, we defined new product development in the context of firm's perspective toward newness. We proposed twelve NPD constructs and four firm owners' characteristics to distinguish between firms that are active in NPD and those that do not.

Our empirical results, however, indicated that only six of those variables (concept development, adequate technology, NTFMs, educational level, and years in business) can be used to discriminate these two categories of firms. Among the firms' internal factors studied, firm owners' educational qualification and the length of time a firm has been in business appear to be the discriminant factors that can be used to differentiate firms that are actively engaged in new product development (NPD) activities from those that are not, an indication that, for SMFEs, NPD activities depend largely on the competencies and capabilities of the owners.

Even though the use of non-timber forest materials contributed the least to the discriminant function, its use by SMFEs has proved worthwhile. Furniture and furniture parts made from these materials have, in recent times, enjoyed considerable patronage at the marketplace. It is estimated that in 2009, exports of bamboo and cane furniture and parts valued at USD2.51 billion (ITTO, 2010). While previously furniture products had been almost exclusively made from solid wood, new trends have been to the introduction of more environmentally-friendly non-timber forest materials (NTFMs) such as rattan, cane and bamboo. The use of these materials may have been driven by several factors. First, the seeming depletion of the Ghanaian forest and the concomitant scarcity of valuable and traditional timber species most preferred for furniture production has motivated SMFEs to look for alternative furniture materials. Second, the deep-rooted perception of the Ghanaian consuming public about the exploitation of timber as the major contributor to the depletion of forest has triggered the SMFEs to use NTFMs which is considered more benign than timber. Third, the global concern about the exploitation of tropical forests has made furniture products from NTFMs more attractive to both local and global consumers. This trend reflects the model advocated by OECD (2009) that global challenges have become drivers of innovation. Despite its acceptability, the use of NTFMs is not widespread among SMFEs in Ghana. For example, few SMFEs (10%; n= 21) reported that rattan was used to produce furniture with the older firms more likely to use this material than the new entrants (Chi-square=19.787; p=0.031). Our empirical results showed that educational level of firm owners, F (10, 3)=0.645; p=0.521 did not affect firms propensity to use NTFMs to produce a wide variety of products. However, the synergy between educational level and years in business affected firms propensity to use NTFMs for furniture production, F (10, 5) = 2.232; p=0.050.

5.0 Conclusion and policy implications

Imitation appears to be the overarching new product development tactics adopted by small and medium-scale furniture enterprises in Ghana. We posit that the Ghanaian SMFEs use imitation tactics mainly because of weak technological support and also as part of frantic effort to reduce cost of production. Our findings provide evidence to support the important role firm owners' educational qualification and experience play in shaping firm's NPD activities. Specifically, firm owners with higher educational qualifications are more likely to use a variety of tactics, other than imitation, to engage in NPD activities. More revealing is the effect of the synergy between educational qualification and experience of firm owners in providing the necessary catalyst for firms to make use of more environmentally-friendly non-timber forest materials to manufacture new and eco-friendly furniture products. However, it appears the enterprise is largely dominated by entrepreneurs with lower level of education thus limiting their capacity to take full advantage of green innovation.

The foregoing provides sufficient evidence that the Ghanaian SMFEs are still in their infancy in terms of technological capabilities and innovation. In order for the Ghanaian SMFEs to stay competitive at both local and global fronts, a number of policy measures need to be put in place and vigorously pursued. Policy makers should create the necessary platform that would allow SMFEs to forge partnership and networking with large and multi-national firms to bring about technology transfer and technology diffusion. Government should make effort to erase the long-standing perception that furniture enterprise is the preserve of non-tertiary graduates. Awareness creation and incentive packages should be used to encourage entrepreneurs with higher qualifications to take up furniture production business. In terms of materials, focusing more on furniture products from non-timber forest materials could provide a window of opportunity for the SMFEs to engage in the export of more eco-friendly furniture products. Providing technical and market intelligence support in this regard could help the Ghanaian SMFEs compete favourably on the global market.

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