A Comparative Study on Timber Productivity by Timber Firms in Ghana as Influenced by Ownership

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ABSTACT

Some of the major problems that confront the timber industry in Ghana are: The industries inability to diversify value-added products for export as well as decline in export volumes, prices, and number of sawmills which are actively engaged in the production and exportation of wood products especially the locally-owned. Furthermore, the capacity of forest sector has also reduced. These developments present a challenge to the local entrepreneurs in the face of globalization; and for that matter, the need to conduct an empirical comparative study into the issues to find solutions to mitigate them is now. The average number of products exported ware 3 and 4 by the locally- and foreign-owned firms respectively. In general, both categories of firms showed declines in eight low export prices of wood products from 2000 to 2008. Air-dried and kiln-dried lumber were the dominant products exported by both categories of firms. The foreign-owned timber firms exported ten high-priced timber products and eight by their counterparts; this makes the foreign-owned firms more diversified than the locally-owned firms. It is also worthy of note that, more than half (59%) of the foreign-owned firms exported between 4 and 6 products while less than one-fourth (23%) of the locally-owned firms exported the same number of products. Only one foreign owned firm exported products of 10 and above. Again the foreign owned - firms concentrated more on value added products while the locally-owned - firms specialized on primary products. This suggests that the foreign-owned firms are more efficient than their local counterparts. Statistical analysis conducted on all the products using (Wilcoxon Signed Ranks Test) indicated that the differences were not statistically significant. Finally, the timber firms in Ghana should take innovative measures to diversify and maximize the recovery rate of volume and value of timber products especially the locally owned–firms so that they can compete globally.

Key words: Diversification, Productivity, Timber firms, Ghana, Ownership, Timber, Efficiency

1.0 Introduction

In spite of the importance of the forest sector to the Ghanaian economy, the sector continues to experience declines in the volumes of export products. With the globalization in full flight, the forest sector of the Ghanaian economy faces competitions on an unprecedented scale. Ghanaian plywood, for example, continues to face competition from softwood plywood produced from China and Europe. The future of the Ghanaian competitiveness in the wood industry depends on how well the timber firms can adapt to changes. The industries success depends on improving efficiency and productivity, developing new products, technologies and markets, establish closer ties with customers and maintaining a skilled and flexible workforce (Acquah & Whyte, 1998 Amoah, 2008, FAO, 1999).

Ownership of the timber industry in Ghana has witnessed dramatic changes since the structural adjustment programme (SAP) of the 1980s. As of 2008, sawmills with government ownership have reduced to only two from ten in 1980. Foreign-owned sawmills, on the other hand, have relatively increased, while the number of locally-owned sawmills who are actively engaged in the production and exportation of wood products has experienced declines in recent times. This development presents a challenge to the local entrepreneurs. The challenge even becomes enormous in the face of globalization. This situation has reduced the forest sector's capacity to

generate employment and make the industry vibrant. The concomitant effect is that technical students are reluctant to opt for woodwork at the senior high school level or even at the polytechnic and university level. Another problem which has not been given the needed attention is diversification of the timber products being manufactured and exported by the timber industry. Product diversification reduces market risk and allows for efficient utilization of wood fibre (walker, DeForest, Hoover, & Barbee, 1993; Acquah and Whyte, 1998; Okai, 2003 Amoah, 2008, FAO, 1999).

The purpose of the study was to compare the performance of locally-owned and foreign-owned timber firms in terms of value-added products, export prices and the proportions of volume of timber that were allocated to the various export products. The study was guided by the following objectives: One, to compare the number of timber firms which are in active production by ownership; two, to find out whether foreign owned firms have more product lines than locally owned firms; three, to compare the volumes (proportions) of timber that was allocated to manufacture the various timber products; four, to compare export prices of timber products from locally owned firms and foreign owned firms. The study was also guided by the following research questions: Do foreign owned firms have more product lines than locally owned firms? What Proportion(s) of input logs are use to manufacture the various products? How do export prices of timber products differ from locally owned firms and foreign owned firms? It is the researchers hope that, the causes of the firm's inability to diversify are found and appropriate solutions identified to curtail the problem of low diversification and recommendations made will go a long way to help the timber firms to effectively diversify so as to remain competitive and to make informed decision manage the various timber industries in Ghana and beyond. Finally, the study will contribute to existing knowledge on diversification of timber and serve as a springboard for further studies

2. Literature Review

2.1 Forest management

Due to poor forest management and control, poor forest policy and implementation, poor logging and processing practices, Ghana for some time now has suffered great loss in forest products especially timber products. The area of tropical forest globally is estimated at 1.756 billion hectares and is distributed as follows: 913 million hectares constituting 52% in tropical America, 527million hectares constituting 30% in tropical Africa and 316 million hectares constituting 18% in tropical Asia (Okai, 2003). Ghana's share of the earth covers an area of 23.9 million hectares and spans two major ecological zones. The high forest zone is confined to the southwestern third of the country, while northern and coastal savannah cover the rest. Within the savanna zone 1,052,000 hectares are in wild life reserves. The high forest zones include 1.76 million hectares that are permanently protected 1.634 million hectares in forest reserves and 126,000 hectares in wild life reserves (Ministry of Lands and Forestry, 1995 as in Amoah, 2008). Timber from natural forest in Ghana is dwindling at an alarming rate culminating in reduction of the forest cover from 8 million hectares in 1980 to a present area of 1.7 million hectares. The current annual allowable cut (AAC) of timber in Ghana is 1 million m^3. However, the installed capacity of wood processing sector is 3.5 million m^3 per annum. This means that a way has to be found to help meet the timber demands of the downstream processing sector. In Ghana, for every tree felled, nearly 50% of the total tree volume is left in the forest in the form of branches, stumps and crown wood (Okai, 2003).

In another development, it was stated that an estimate figure of about 1.5 million harvest of 'intact closed forest' were remaining in Ghana. The annual rate of deforestation was estimated to be about 22,000 hectares in the 1990s compared to 21 million estimate of forest lost globally in the tropical forest alone (FAO, 1998; IUEN, 1992 as in Amoah, 2008). The current annual rate of deforestation is not known, but it is estimated to be lower than what it used to be in two decades ago (Agyarko, 2001). This has resulted into a serious extinction of the most valuable timber species. An inventory conducted in 1989 indicated that, the rate of extraction of the traditional timber species far exceeded their annual growth rate a situation that calls for prompt action" (Benhin & Barbier, 2004). Timber production can be increased if logging residues are utilized. Damages to residual forest due to poor logging (harvesting) techniques have contributed immensely to the destruction of the tropical forest (Okai, 2003; Okai, Frimpong-Mensah & Yeboah, 2004)

2.2 Diversification

Even though, diversification has long remained a murky area in our understanding of industrial organization generally and in particular as it affects the efficiency of timber firms in Ghana. Firms that produce large numbers

of products are less specialized (more diversified) than those producing fewer products. Product diversification at the firms' level is a strategy that may be adopted in order to enlarge a firm so as to exploit the economies of large scale firm production (Safarian 1966; Scherer, Beckenstein, Kaufer & Murphy, 1975). There was a downward trend in firms' diversification or an increase in firms' specialization over the period for both locally- and foreign-controlled firms. The decline was faster for foreign-controlled firms, particularly before 1988. In the 1970s, foreign-controlled firms were more diversified than their locally-controlled counterparts. In 1996, the difference in their diversification was quite small (Baldwin, Sabourin & Smith 2004). In a related study Baldwin, Caves & Gu, (2005) indicated that although empirical analysis addresses diversification at the firms' level, the incentive to diversify demands attention because it can trigger decisions to diversify a firm's output. The pivotal idea is that a value-maximizing firm might profitably market diverse products because it enjoys some sort of scope of economies. It could be cheaper to produce two or more products in a single large firm than in two smaller firms. Indeed, this situation could hold even if diseconomies of scope occur within the firm (Skinner 1974).

Diversification might be an efficient way to build capacity at a particular point in time, yet the excess capacity that justifies adding another product might be invisible to the observer who subsequently tries to understand the firm's diversification history (Markides, 1995). The reasons for firm- level diversification are numerous among are: industries that enjoy substantial scale economies have more incentive to add product lines to a firm to exploit these economies (Baldwin et al. 2005) Industries that stress new product and process innovations also possess the indivisible assets that enhance the incentive to diversify. Higher exporters are more productive and more innovative than low-exporters (Baldwin and Gu, 2003). Gort (1962) and Baldwin, Beckstead & Cave (2002) found that large firms are more diversified than small firms.

2.3 Export/Market Competition

Notwithstanding the dwindling forest product in Ghana there is a growing competition on the international market as new players emerge. Countries such as China, Russia, Brazil, Chile, Indonesia and New Zealand compete with Canada in gaining larger market share relying on their comparative advantages, which include large areas of natural forest, high productivity, plantation sites among others (Baldwin & Gu, 2003). Not only Canada's share of forest product which faces stiffer competition and has dwindled from 24% in 1965 to 17% in 2002. Ghanaian plywood continues to face mounting pressure from China and in contrast to 2004 and 2005 it became extremely difficult to compete with Chinese sale in to export market (Baldwin & Gu, 2003; Donkor, Alhassan, & Wilson, 2006). The statement continued to state that the situation will be worse in the years ahead. And that the only option is to seek neighboring African market for sales.

Not only plywood that faces strict competition but other Ghanaian wood products as well, with exception of sawn lumber which increased quiet significantly in 2008. Despite the numerous challenges faced by the Ghanaian timber industry, the latest export data available suggest that Ghanaian exporters of wood and wood products could well be facing a better future than they have experienced during the past few years (Donkor, Alhassan, & Wilson 2006). They further states that "The total export of timber and wood products reached a volume of 466. 155m³ and value of Euro 184.0 million last year (2006), up by 2.4% and 7.9% respectively as compared to the previous year. It is expected that in 2006 exported volume will reach 470,000m and value in Euro will be 190 million". Certainly Ghana will continue to face stiffer competition from China and other Asian wood producers on the export market in future years But by focusing on efficient wood processing high quality products, strong environmental credentials trough forest certification, diversification of markets and effective delivery, Ghana is well placed to meet the challenge (Donkor, Alhassan, & Wilson, 2006). Again, the future of the competitiveness in the wood industry depends on how well firms can adapt to changes. The industries success depends on improving efficiency and productivity, developing new products, technologies and markets, establish closer ties with customers and maintaining a skilled and flexible workforce (Otchere, Annan & Anin, 2013).

3. Methodology

The Timber Industry Development Division's (TIDD) annual statistical report, which is a comprehensive listing of all timber firms engaged in the exportation of timber products and the volumes and values of such products, was the source of data for this study. The primary objective of this study was to compare the performance of the locally-owned and foreign-owned timber firms on the basis of the number of export products per firm, the number of each category of firm engaged in the exportation of low-priced and high-priced products, the

proportion of the total export volume of wood allocated to the low-priced and high-priced products and the prices of wood products exported by these category of firms. The statistical report of TIDD indicated that over three hundred (300) timber firms were engaged in the exportation of about twenty (20) timber products. The report, however, did not indicate the ownership of the timber firms. Therefore, an official request was sent to the following institutions to provide information on the ownerships of the timber firms in Ghana: Association of Ghana Industries (AGI), Federation of Association of Ghana Exporters (FAGE), Ghana National Chamber of Commerce Industry (GNCCI), Ghana Association of Employers (GAE), Ghana Timber Millers Organisation (GTMO), National Board for Small Scale Industries (NBSSI), Ghana Export Promotion Board (GEPB), Ghana Employers Association (GEA)

A locally-owned firm was operationally defined as a timber firm owned by a Ghanaian which has a processing facility (sawmill, ply mill, etc) to convert logs into a timber product. A foreign-owned firm was also operationally defined as a timber firm owned by a non-Ghanaian which has a processing facility (sawmill, ply mill, etc) to convert logs into a timber product. The request for ownership resulted in the identification of ownerships of seventy two firms, 38 and 34 of which were locally-owned and foreign-owned respectively. The wood products used in this study included lumber (air-dried), lumber (kiln-dried), plywood, sliced veneer, rotary veneer, processed moulding, flooring, boules, curls veneer, dowels, furniture parts, profile boards, broomsticks, poles and sleepers. These products were selected because they were the main export products and have over the study period been consistent and have substantial export volumes by most timber firms under study. These export products were further grouped into low-value and high-value products based on their average export products. The study used a nine-year period data spanning from 2000 to 2008. This period was chosen because it is a first face of continuous study and the data was readily available. Also it is a period where critical interventions were been pursued and it is closer to current issues and therefore had impact on current performance of the two category of firms under study.

All data analysis was carried out using Microsoft Excel 2007 and the Statistical Package for the Social Sciences (SPSS) software version 15.0. A non-parametric test was conducted to find any statistically significant differences in the variables used to assess the performance of the locally owned and foreign-owned firms. All the variables were tested at the p-value of 0.05 or 0.01 levels of probability. To have a comprehensive analysis all unrealistic figures (too large or too small) were removed from the data before analysis were done for the mean export prices and volumes. Also prices for sliced veneer and curls veneer were in (m^2) therefore they were multiplied by 0.002 to convert them from (m^2) to (m^3) so as to be consistent with all other products. Furthermore, products with few export years were not discussed for the mean export prices since they could not have given a balance comparison; hence, the credibility, reliability, validity, and accuracy of the result are assured.

4.0 RESULTS

4.1 Number of firms engaged in the exportation of timber products

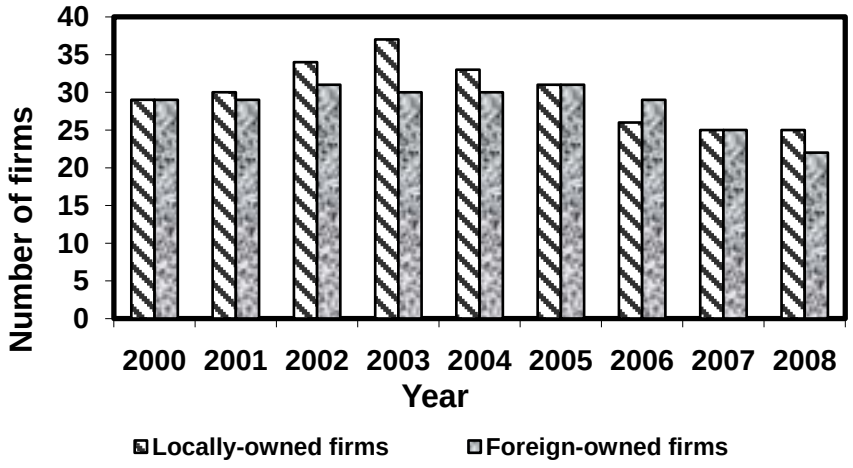

Fig 1- Number of locally- owned and foreign-owned firms engaged in the exportation of timber products

It is discerning enough from fig. 1 that in general the locally-owned firms have greater number of firms than their foreign counterparts. Apart from 2000 and 2005 that both firms were at par with each other, and in 2006 the foreign-owned firms gain more number of firms than the locally-owned firms, all the remaining years were in favor of the locally owned firms with 2003 showing the most significant difference.

4.2 Number of export products per firm

The number of products exported by the individual firms is a good indicator of the industry's product diversity. A decline in the number of export products per firm over the study period is discernable (Table 1). In 2000, the number of products exported by the locally-owned firms averaged 3 (median=3) compared to 5 (median=4) by the foreign-owned firms. Majority of the locally-owned firms exported only one product in 2000 while the foreign-owned firms exported four products. The average number of export products exported by the locally-owned firms was reduced to two (median=2) in 2008 compared to four (median=3) by the foreign-owned firms (Table1).

Table 1-Number of Export Products per Firm

Year	Ownership	Mean	Median	Standard Deviation	COV	Mode	Min.	Max.	P-value (t-test)
2000	Local	3.2	3	2.25	70	1	1	9	0.015
	Foreign	4.7	4	2.25	49	4	1	9	
2001	Local	2.7	3	1.32	49	3	1	6	0.001
	Foreign	4.6	4	2.27	49	5	1	11	
2002	Local	2.1	2	1.07	51	2	1	6	0.001
	Foreign	3.9	3	2.21	5.9	2	1	9	
2003	Local	2.5	2	1.26	50	2	1	7	0.001
	Foreign	4.7	5	2.50	53	5	1	11	
2004	Local	2.1	2	1.15	54	2	1	5	0.001
	Foreign	4.8	4	1.31	48	3	2	10	
2005	Local	2.4	2	1.26	56	2	1	7	0.001
	Foreign	4.1	4	1.91	47	4	1	8	
2006	Local	2.5	2	1.16	66	2	1	7	0.007
	Foreign	4.3	4	2.65	61	2	1	10	
2007	Local	2.4	2	2.04	84	1	1	10	0.002
	Foreign	4.5	4	2.50	56	3	1	10	
2008	Local	1.9	2	1.20	61	1	1	6	0.007
	Foreign	3.5	3	2.11	61	3	1	8	

The maximum number of products exported by the locally-owned firms was ten in 2007 compared to eleven in 2001 and 2003 by the foreign-owned firms. Between 2000 and 2008, the average number of products exported by the foreign-owned firms was statistically significantly higher than those by the locally-owned firms.

4.2.1 Comparison of Number of Timber Products exported by locally-owned and foreign-owned Firms

Figures 2 and 3 indicate the number of locally-owned and foreign-owned timber firms engaged in the exports of low-priced timber products respectively. Eight of such products were identified as the products exported by locally-owned and foreign-owned timber firms from 2000 to 2008.

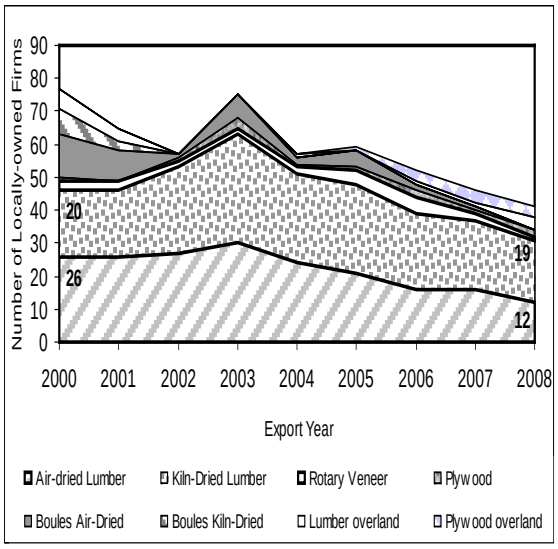

Fig 2- Number of locally-owned firms exported low-priced products

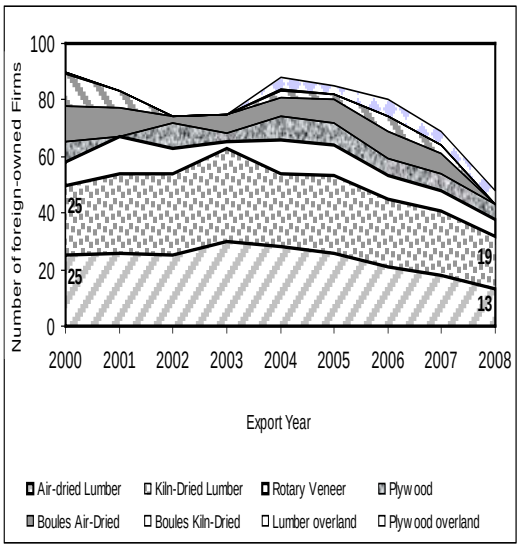

Fig 3- Number of foreign-owned firms exported low-priced products

In general, the number of locally-owned and foreign-owned firms exported these products showed declines from 2000 to 2008 (fig 2 and fig 3). Air-dried and kiln-dried lumber were the dominant products exported by both categories of firms. The number of locally-owned firms engaged in the exports of air-dried lumber decreased from 26 in 2000 to 12 in 2008, representing about 54% decline, while the foreign-owned firms engaged in the exports of the same product experienced a decline of 48% during the same period. The declines in the number of locally-owned and foreign-owned firms which exported kiln-dried lumber were 5% and 25% respectively. The number of locally-owned and foreign-owned firms that exported high-price products is shown in Figures 4 and 5. The high-priced products identified included sliced veneer, moulding, flooring, furniture parts, dowels, profile boards, layons, and curls veneer. In general, more foreign-owned firms were engaged in the exportation of the high-priced products than the locally-owned firms. In 2000, only three and eight (8) locally-owned firms exported sliced veneer and moulding respectively compared to eleven (11) and 16 foreign-owned firms which exported the same products. In 2008, the number of locally-owned and foreign-owned firms which exported sliced veneer and moulding decreased to 1 & 3 and 8 & 10 respectively (Fig. 4 and 5). Between 2000 and 2008, the foreign-owned timber firms exported ten high-priced timber products compared to eight by the locally-owned timber firms indicating that the foreign-owned firms are more diversified than the locally-owned timber firms.

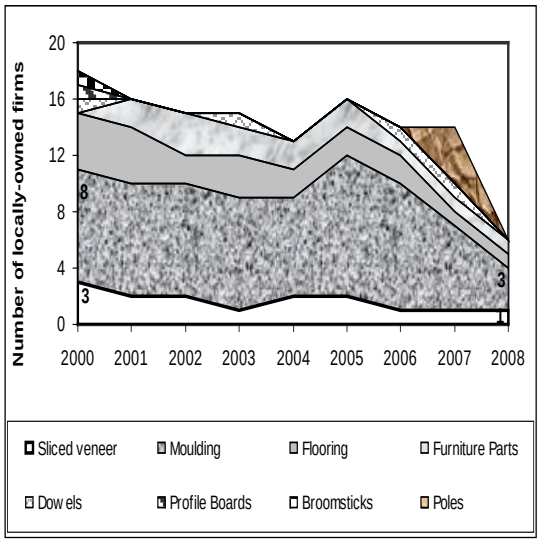

Fig. 4- Number of locally-owned timber firms exported high-priced products.

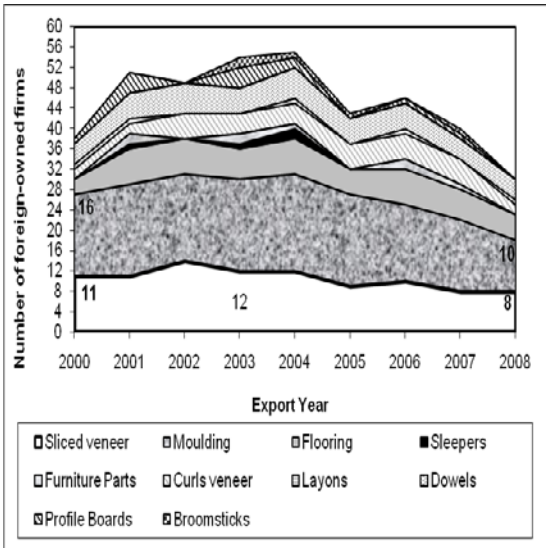

Fig. 5- Number of foreign-owned timber firms exported high-priced products.

4.2.2 Proportion of Firms and the number of export products.

Table 2 shows the proportion of firms by ownership which exported up to three, between 4 and 6, 7 and 9, and 10 or more products. Generally, the timber firms concentrated on the exportation of between 1 and 3 products, with the locally-owned firms focusing more on fewer products than the foreign-owned firms. It is also worthy of note that the proportion of firms who exported fewer products increased from 2000 to 2008. Most of the locally-owned firms (65%) exported up to 3 products in 2000 and this proportion increased to 92% in 2008. Almost one-fifth (17%) of the foreign-owned firms exported a maximum of 3 products in 2000 and this figure disproportionately increased to 64% in 2008.

Table 2- Proportion of Firms and the number of export products

Year	Ownership	Proportion of Export Products			
		1-3	4-6	7-9	10 or more
2000	Local	64.6 (20)	22.6 (7)	12.9 (4)	-
	Foreign	17.2 (5)	58.6 (17)	24.1 (7)	-
2001	Local	76.7 (23)	23.3 (7)	-	-
	Foreign	34.5 (10)	48.2 (14)	13.7 (3)	3.4 (1)
2002	Local	94.1 (32)	5.8 (2)	-	-
	Foreign	54.8 (17)	29.1 (9)	16.2 (5)	-
2003	Local	89.2 (33)	10.8 (4)	-	-
	Foreign	36.7 (11)	43.3 (13)	16.7 (5)	3.3 (1)
2004	Local	84.8 (28)	15.2 (5)	-	-
	Foreign	40.0 (12)	36.7 (11)	19.9 (6)	-
2005	Local	80.6 (25)	22.6 (5)	3.2 (1)	-
	Foreign	38.7 (12)	42.0 (13)	19.4 (6)	-
2006	Local	76.9 (20)	19.2 (5)	3.8 (1)	-
	Foreign	48.3 (14)	34.4 (10)	13.8 (4)	3.4 (1)
2007	Local	76.0 (19)	20.0 (5)	4.0 (1)	-
	Foreign	45.8 (11)	33.3 (8)	12.5 (3)	8.3 (2)
2008	Local	92.0 (23)	8.0 (2)	-	-
	Foreign	63.6 (14)	27.2 (6)	9.1 (2)	-

The figures in the parenthesis are the number of firms

More than half (59%) of the foreign-owned firms exported between 4 and 6 products while less than one-fourth (23%) of the locally-owned firms exported the same number of products in 2000. In 2008, the proportion of foreign-owned and locally-owned firms which exported 4-6 products decreased to about one-third (27%) and 8%

respectively. In 2000, just about 13% (n= 4) of the locally-owned firms exported between 7 and 9 products compared to about one-fourth (24%; n= 7) of the foreign-owned firms which exported the same number of products. In 2008, however, none of the locally-owned firms exported those number of products, while only 9 % (n= 2) of the foreign-owned firms who were engaged in the exportation of timber products exported the same number of products. Fewer number of foreign-owned timber firms exported 10 or more products in 2002, 2004, 2007 and 2008. However, the locally-owned firms did not register those numbers of products during the period under study (Table 2).

4.3 Comparison of Percentage Volume of Timber into various Products Exported by Locally-owned and Foreign-owned Firms.

Fig 6 and 7 shows a graphical representation of percentage volume of timber into various low-priced (Primary) products exported by locally-owned and foreign-owned firms between 2000 and 2008,

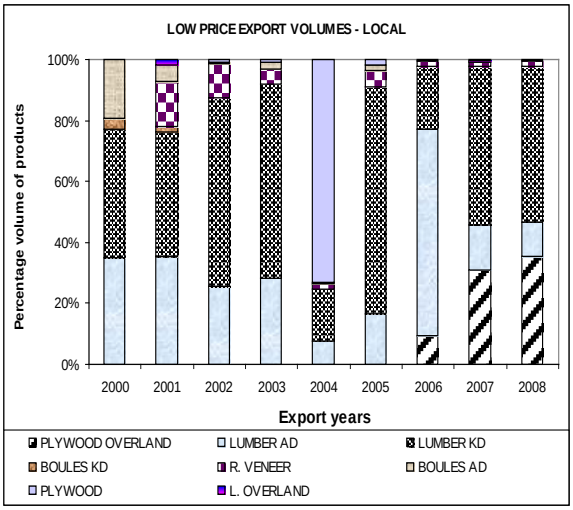

Fig 6 yearly volume percentage of timber into various low-priced (Primary) Products by locally owned firms

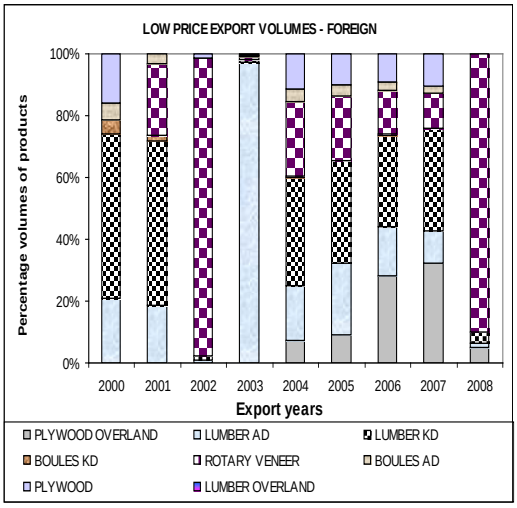

Fig 7 yearly volume percentage of timber into various low-priced (Primary) Products by foreign owned firms

It is quite clear that, the exported volume of low-priced (Primary) products was about 85% for the locally-owned firms. While about 75% of the total volume of timber went into production of lumber (KD & AD) alone the remaining 25% was shared disproportionately by the other six (6) products. In 2004 plywood recorded about 77%, the highest volume percentage ever and plywood overland increased from 10% in 2006 to about 40% in 2008.

The foreign owned firms indicated otherwise for the low-priced (Primary) products with the highest percentage volume went into the production of Sliced veneer about 24%, Rotary veneer and Processed L. moulding had about 38%, 31% went into lumber (KD and AD) and the remaining 7% went into lumber overland, boules (AD & KD). It is worthy of note that in 2002 Rotary veneer increased to 93% but dropped to 83% in 2008 whiles lumber AD started with 12 & in 2000 and increased significantly to 95% in 2003.

Figures 8 and 9 also indicate the percentage volume of timber into various high-priced (Secondary) timber products exported by locally-owned and foreign-owned firms respectively, between 2000 and 2008,

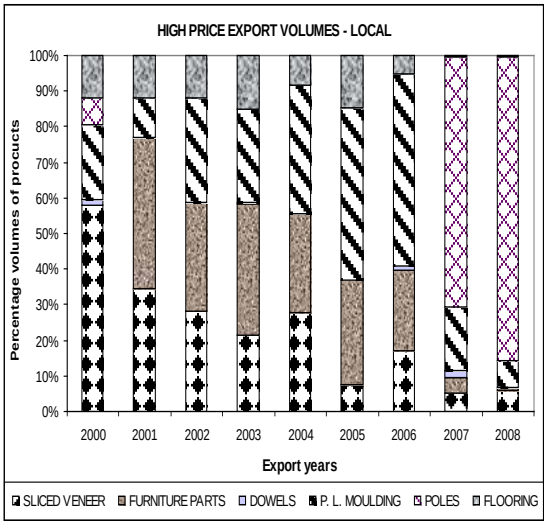

Fig 8 yearly volume percentage of timber into various high-priced (Value added) products by locally owned firms

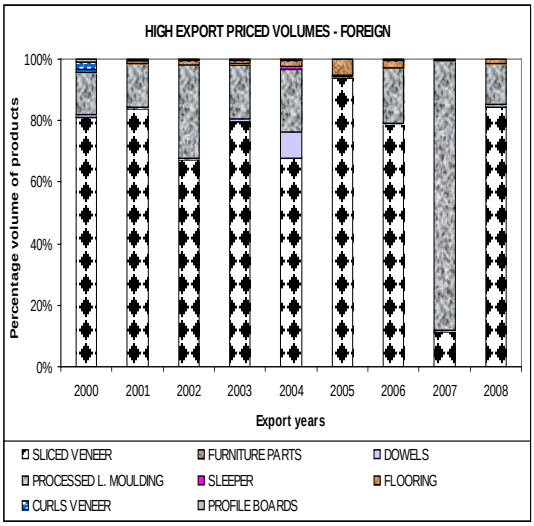

Fig 9 yearly volume percentage of timber into various high-priced (Value added) Products by foreign owned firms

The locally owned firms exported six (6) high-priced (Secondary) products in 2000 sliced veneer recorded about 57% but suffered gradual attrition to about 6% in 2008 with an average percentage of 28. Processed L. moulding recorded about 25% followed by Furniture parts also indicates an average of 21% and the rest of the products shared the remaining 26%. The foreign-owned firms on the other hand exported eight (8) high-priced (Secondary) products with sliced veneer dominated with an average volume of about 70%, it started with 80% in 2000 increased to about 95% in 2005 and finally dropped to 80%in 2008. Processed L. Moulding also recorded about 16% in 2000, increased to 90% in 2007 and subsequently reduced to about 16% in 2008 with an average volume share of about 24%. The 6% remaining volume went into the rest of the products unequally.

4.4 Comparison of export prices of various Products Exported by (a) Locally-owned and (b) Foreign-owned Firms in (US$/m$^{3)}$.

The subsequent tables show statistical representation of export prices of various timber products exported by locally-owned and foreign-owned firms between 2000 and 2008.

Table 3-Mean Export Prices (US$/m^3) of lumber air-dried products by ownership

Year	LUMBER (A.D.)			P. L. MOULDING		
	OWNERSHIP		P-value	OWNERSHIP		
	LOCAL	FOREIGN		LOCAL	FOREIGN	P-value
2000	290 (101)*	312 (94)	0.284	413 (135)*	479 (220)	0.520
2001	287 (109)	299 (107)	0.884	541 (237)	411 (149)	0.123
2002	317 (113)	305 (91)	0.949	506 (118)	425 (121)	0.093
2003	283 (90)	307(76)	0.194	451 (110)	436 (129)	0.735
2004	316(127)	345 (149)	0.269	355 (44)	437 (152)	0.735
2005	346 (120)	351 (149)	0.889	399 (80)	462 (217)	0.203
2006	359(112)	372 (114)	0.730	392 (66)	482 (167)	0.374
2007	341 (131)	322 (58)	0.501	410 (94)	495 (169)	0.917
2008	364 (131)	329 (98)	0.347	437 (85)	496 (157)	1.000

*figures in parenthesis are the standard deviation values

Table 3 represents mean export prices of lumber (AD). In 2000 the locally owned firms started with a price of 290US$/m³, dropped to 283(US$/m³) in 2003 but the highest price of 364(US$/m³) was recorded in 2008. The percentage increase was about 29%, while the foreign started with 312(US$/m³) in 2000 and the figure fluctuated to 328US/m^3 in 2008. The highest price recorded was 372 US$/m³ in 2006 and the least was 299(US$/m³) the percentage difference was about 24%. Statistical analysis (Wilcoxon signed ranks test) showed that the difference between the locally owned firms and firms with foreign ownership was not statistically significant (P-value=0.194/0.949)

Table 4-Mean Export Prices (US$) of lumber kiln -dried and flooring products by ownership.

YEAR	LUMBER (K.D.) OWNERSHIP		P-value	FLOORING OWNERSHIP		P-value
	LOCAL	FOREIGN		LOCAL	FOREIGN	
2000	364 (164)*	349 (81)	0.650	700 (426)*	639 (34)	0.040
2001	311 (90)	328 (77)	0.184	648 (418)	742 (148)	0.500
2002	354 (122)	377 (106)	0.326	1096 (365)	751 (245)	0.109
2003	345 (113)	379 (102)	0.075	676 (387)	747 (183)	
2004	335 (84)	407 (96)	0.128	947 (131)	871 (191)	0.109
2005	349 (79)	407 (135)	0.041	1294 (0)	713 (427)	
2006	376 (104)	310 (119)	0.277	938 (75)	692 (308)	0.180
2007	391 (134)	433 (112)	0.104	610 (0)	769 (334)	
2008	387 (113)	407 (110)	0.679	907 (0)	690 (303)	

*figures in parenthesis are the standard deviation values

From table four (4) The highest export price for lumber (KD) local was 391(US$/m³) in 2007 and the least was 311(US$/m³) in 2001 with a percentage difference of about 26%, while the foreign showed 433(US$/m³) as the highest also in 2007 and the least was 310(US$/m³) in 2006 with difference of about 40%. The Wilcoxon signed ranks test showed that the difference between the two firms was not statistically significant (P-value=0. 041/0.679). For flooring, the minimum and maximum price for the local was 610(US$/m³) and 1294(US$/m³) respectively, but in 2000 the price was 700(US$/m³) and ended in 2008 with 907(US$/m³) an increase of about 30%. The foreign also started in 2000 with 639(US$/m³) and increased to a peak of 871(US$/m³) in 2004, but dropped to 690(US$/m³) in 2008 to show a marginal increase of about 10%. The Wilcoxon signed ranks test however showed that the difference between the two categories of firms was not statistically significant.

Table 5 indicates mean export prices of Plywood and rotary veneer. Averagely plywood gave a price for the locally owned firms as 260(US$/m³), whiles the Foreign-owned Firms indicated 352(US$/m³). Statistical analysis (Wilcoxon signed ranks test) showed that averagely the difference between the locally owned firms and firms with foreign ownership was not statistically significant (P-value=0.491). Rotary veneer on the other hand showed a price of 242(US$/m³) and 266(US$/m³) in 2000 for locally owned firms and firms with foreign ownership respectively. Whiles the locally-owned firms increased to 277(US$/m³) in 2008, the foreign-owned firms decreased to 252(US$/m³) in the same year. The percentage increase or decrease was about 14% for the local-ownership whiles the foreign was about 6%. Statistical analysis (Wilcoxon signed ranks test) showed that the difference between the locally owned firms and firms with foreign ownership was also not statistically significant (P-value=0.180/0.686).

Table 5-Mean Export Prices (US$/$m^3$) of plywood and rotary veneer products by ownership

YEAR	PLYWOOD OWNERSHIP		P-value	ROTARY VENEER OWNERSHIP		P-value
	LOCAL	FOREIGN		LOCAL	FOREIGN	
2000	206 (0)	272 (36)*	0.026	242 (22)*	266 (26)	0.331
2001				229 (19)	246 (33)	0.285
2002	198 (31)	287 (27)	0.180	221 (3)	267 (45)	0.180
2003	240 (13)	257 (45)	0.593	243 (34)	246 (32)	0.655
2004		262 (39)		256 (36)	225 (36)	0.655
2005	221 (0)	276 (40)		572 (649)	227 (45)	0.465
2006	241 (28)	269 (49)	0.655	253 (39)	231 (64)	0.686
2007	197 (0)	318 (104)		222 (11)	260 (43)	0.180
2008	520 (14)	513 (13)	0.137	277 (0)	252 (31)	-

*figures in parenthesis are the standard deviation values

Table six (6) represent export prices of boules (KD & AD) The highest export price for boules (KD) local was 266(US$/m³) in 2001 and the least was 179(US$/m³) in 2003 with a percentage difference of about 49%; however, only three years recorded exports, while the foreign showed 527(US$/m³) as the highest also in 2006 and the least was 214(US$/m³) in 2000 with difference of about 146%. The Wilcoxon signed ranks test showed that the difference between the two firms was not statistically significant (P-value=0. 109/0.906). For AD, the minimum and maximum price for the local was 170(US$/m³) and 500(US$/m³) respectively, but in 2000 the price was 213(US$/m³) and ended with 500(US$/m³) in 2007. An increase of about 135% the foreign also started in 2000 with 256(US$/m³) and increased to a peak of 504(US$/m³) in 2007, showing a significant increase of 97%. The Wilcoxon signed ranks test however showed that the difference between the two firms was not statistically significant (P-value=0. 030/0.655).

Table 6-Mean Export Prices (US$) of boules kiln -dried and boules air - dried products by ownership.

YEAR	BOULES (K.D.) OWNERSHIP		P-value	BOULES (A.D.) OWNERSHIP		P-value
	LOCAL	FOREIGN		LOCAL	FOREIGN	
2000	205 (12)*	214 (21)	0.906	213 (67)*	256 (66)	0.030
2001	266 (54)	243 (76)	0.109	194 (88)	267 (76)	0.208
2002				170 (0)	301 (146)	
2003	179 (0)	428 (89)		213 (73)	327 (108)	0.091
2004		384 (91)		477 (0)	432 (62)	
2005		490 (56)		383 (64)	473 (30)	0.500
2006		527 (33)		370 (198)	409 (140)	0.655
2007		479 (181)		500 (0)	504 (14)	
2008	-	-	-	-	-	-

*figures in parenthesis are the standard deviation values

5. Discussion and conclusions

5.1 Discussion

It is quiet evident that the firms with foreign ownership are more diversified than their local counterparts; even though, the locally owned firms have little more firms than those with foreign ownership. This confirms the general perception that the foreign owned firms are more diversified than locally owned firms (Gort 1962, Baldwin, et al, 2002). In 2000 the locally owned firms exported an average of 3 products while mills with foreign ownership exported an average of 5 products (median=4). It is discernable that the mean export products for both categories of firms experience fluctuation in the subsequent years until a final drop in 2008. The number of products exported by the local firms averaged 2 in 2008 compared with 4 for the foreign owned firms (table 1). Statistical analysis (Wilcoxon Signed Ranks Test) showed that the differences was statistically significant (P-value=0.004).

There was a general decline in eight (8) low priced wood products exported within the (9) year period of study, from 2000 to 2008 by both group of firms. The locally-owned firms declined in lumber kiln-dried of about 5% and the foreign-owned firms by 25%. Another dominant product was lumber air-dried also saw a decline of about 54% and 48% for the locally-owned firms and foreign-owned firms respectively, during the same period (figure 1). The foreign-owned firms indicated 10 high priced wood products as against 8 for the locally-owned firms similarly there was a slim decline in most of the products for both firm categories. The higher diversification of wood products in favor of the foreign-owned firms attests to what is stated in literature. Firms that are growing are more diversified; firms' growth and the addition of product lines are closely related, and diversification is part of the dynamics of the growth process (Baldwin, Caves, & GU, 2005). Large firms differ from small firms in that they are more diversified and younger firms are more specialized (Baldwin, et, al. 2002; Gort, 1962) (fig 2).

The study showed that the locally-owned firms concentrated on fewer products, while their foreign counterparts concentrated on diversified products. Averagely locally-owned firms that exported between 1- 3 products were 25 and percentage volume was about 78%, while the foreign had an average of 12 firms with 42% volume. The number of products between 4 and 6 gave the local 16% volume by 5 firms as against 39% volume and 11 firms for the foreign; between 7 and 9 products the local recorded about 6% by 2 firms while the foreign indicated about 16% by 5 firms. However, the locally-owned firms did not record any export for 10 and above products but the firms with foreign ownership recorded an average of about 3% by a firm (table 2). This is as a result of central idea that a value maximizing firm might profitably market (diverse) products because it enjoys some sort of scope economies (Baldwin, et al 2005).

The total average percentage volume for lumber (AD & KD) alone accounted for about 70% and the remaining 30% was distributed disproportionately among the remaining firms for the local. The foreign on the other hand showed 63% volume for the secondary products such as Sliced veneer, Rotary veneer and Processed L. moulding, followed by lumber (AD & KD) with 31% volume and the remaining 6% went in to other products unequally (fig 6-9). It is discerning enough that the foreign owned firms concentrated more on value added products while the locally-owned firms concentrated more on primary products. This suggests that the foreign-owned firms are more efficient than their local counterparts. This is consistent with literature: that increased productivity of materials could come either from an increased lumber recovery per unit of round wood input through technological advances (Amoah 2008; Okai 2003). Industries development largely focuses on value added secondary processing as opposed to primary production (Vlosky & Chance, 1996). Performance of a firm must be based more on efficiency rather than just the productivity (Lin, 2001 and Ehrlich, 1994 as in Amoah 2008).

Statistical analysis conducted on all the products using (Wilcoxon Signed Ranks Test) to test the differences in mean export prices between the locally-owned and foreign owned firms, indicated that the foreign had higher export mean prices than the locally owned firms. However, the differences were not statistically significant; notwithstanding, it is somehow consistent with literature (Zhiqiang, 2001). Despite clear-cut theoretical arguments in favour of the private ownership; the empirical and scientific evidence is not that conclusive. Averagely the mean price for Lumber (AD) was about 323US$/m³ for the local while the foreign was 327US$/m³. In 2000 the locally-owned firms recorded the export price of lumber (AD) of 290US$/m³ compared to 312US$/m³ for the foreign-owned firms (fig 4) with difference of 11% increase for the foreign ownership.

Lumber (KD) presented an average mean price for the locally owned firms as 357(US$/m³) against 377(US$/m³) for the foreign with a percentage difference of 20% and (P-value = 0.274) (fig5, table 4). Flooring gave the average mean price as 686(US$/m³) and 735(US$/m³) for the local and foreign ownership respectively and a percentage difference of 7% (P-value = 165), (fig5, table 4). Plywood also gave an average mean price for local 260(US$/m³) and foreign 307(US$/m³), 18% difference (P-value = 0.318). Rotary Veneer gave average mean price for the local as 279(US$/m³) and foreign 246(US$/m³). The difference was 13% and P-value of 0.430 (fig 6, table 5). The Furniture parts presented an average mean price as 1752(US$/m³) for local and 2524(US$/m³) for the foreign, percentage difference was 44% (P-value=0.180), (fig 7, table 6). Average mean price for Boules (AD & KD) local gave 315(US$/m³) and 216(US$/m³), foreign gave 371(US$/m³) and 346(US$/m³) respectively the differences in percentage of 18 and 60 P-value= 0.297 & 0.508 respectively (fig 8, table 7). Dowels also indicated average mean price for the local as 592(US$/m³) and 625(US$/m³) for the foreign with a difference of 10% (P-value = 0.068) (table 10). The local gave 434(US$/m³) and foreign 458(US$/m³), the difference was 6% for Processed L. moulding (table 10). The marginal difference between the two groups of firms on the mean price

might be accounted for by specialization in some products by the locally-firms as against the diversified nature of the foreign owned firms. Secondary, it may be that the locally-owned firms are becoming more efficient.

There was a clear evidence that the locally-owned firms concentrated (specializes) in fewer products, while their foreign counterparts concentrated on diversified products (more product lines). Averagely, locally-owned firms that exported between 1- 3 products were 25 and percentage volume was about 78%, while the foreign had an average of 12 firms with 42% volume. The number of products between 4 & 6 gave the local 16% volume by 5 firms as against 39% volume and 11 firms for the foreign; between 7 & 9 products the local recorded about 6% by 2 firms while the foreign indicated about 16% by 5 firms. However, the locally-owned firms did not record any export for 10 and above products but the firms with foreign ownership recorded an average of about 3% by a firm (table 2). This is as a result of central idea that a value maximizing firm might profitably market (diverse) products because it enjoys some sort of scope economies The gap in advance technology use between small and large (local & foreign) firms increased in 1999 (Baldwin, et al. 2005, Baldwin, Rama, & Sabourin 1999). In a related work: Baldwin, Rama, & Dhaliwal (2001), (Lin, 2001as in Amoah 2008). Work in large plants has increased relatively to small plants through the period.

5.2 Conclusions

The findings from the studies indicated that the problem of attrition in export volumes and low export prices is persistent in Ghana especially, the locally – owned firms. Another problem which has not been given the needed attention is diversification of the timber products being manufactured and exported by the timber industry as well as value-added products. The number of locally-owned sawmills who are actively engaged in the production and exportation of wood products has also experienced declines in recent times while the Foreign - owned sawmills on the other hand, have relatively increased. These developments present a challenge to the local entrepreneurs. The challenge even becomes enormous in the face of globalization. The number of products exported by the individual firms was a good indicator of the level of industry's product diversity. The number of products exported by the locally-owned firms averaged 3 and 4 by the foreign-owned firms. In general, both categories of firms showed declines in eight low export price products from 2000 to 2008. Air-dried and kiln-dried lumber were the dominant products exported by both categories of firms. During the same period, the foreign-owned timber firms exported ten high-priced timber products compared to eight by the locally-owned timber firms this makes the foreign-owned firms more diversified than the locally-owned timber firms. Again the foreign owned - firms concentrated more on value added products while the locally-owned - firms specialized on primary products. This suggests that the foreign-owned firms are more efficient than their local counterparts. However, statistical analysis conducted on all the products using (Wilcoxon Signed Ranks Test) indicated that the differences were not statistically significant.

In view of the findings of the study it is recommended that: One, the timber firms in Ghana should take innovative measures to diversify more value added products especially the locally owned–firms so that they can compete globally. Two, effective management should be put in place so as to maximize the recovery rate of volume and value through effective processing techniques of logs. Three, massive forestation should be encouraged and all forest policies be implemented to prevent poor logging practices and to increase the forest capacity. Finally, the timber firms should collaborate with schools in Ghana who offer woodwork to train quality, skilled and flexible workforce to effectively manage the timber industry.

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