

# THE ROLE OF DIFFUSION IN TECHNOLOGICAL LEARNING IN THE FURNITURE INDUSTRY: A CASE STUDY OF SOUTHWESTERN NIGERIA

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**Abstract—** The paper presents the factors influencing Technological Learning in the furniture making industry in Southwestern Nigeria. This was with a view to recommending policy measures to enhance the performance of the furniture makers. The research covered Lagos, Oyo, Ondo and Ekiti States because furniture makers are found in the nooks and crannies of the states. The population sample consisted of 319 furniture makers. The research instruments employed were questionnaire, personal observation and focus group discussion approaches. The questionnaire was administered to furniture makers to elicit information on the factors influencing Technology Learning in the industry. Personal observation and focus group discussion were employed to obtain more information. Both descriptive and inferential statistics were employed for data analysis. The research shows that learning in the furniture industry was mainly through on the job training (91.5%). Those who learn furniture work through formal education were 2.2% while the remaining respondents (6.3%) learnt furniture skills through both formal education and on the job training. The Technological Learning by the furniture makers was influenced by age, sex, period of apprenticeship, education, financing of the apprentices and native language of instruction. State and Local government should encourage furniture makers in their domains to establish cluster villages where member firms could derive maximum benefits from clustering. This idea will no doubt enhance innovation among the entrepreneurs.

**Key words—** Technology, Technological and learning; furniture industry.

## I. INTRODUCTION

Technological learning refers to any process that strengthens the technological capability for generating and managing technical change. Technological learning takes place when engines of diffusion spread knowledge to producers. Akinbinu (2001) reported that learning encompasses all of the activities by which a firm can generate its own stock of technological knowledge. Maxwell (1987) sees it as the set of processes by which firms accumulate technical knowledge, know-how and experience relevant to the planning, construction, operation, adaptation, improvement and replacement of production processes.

Oyelaran-Oyeyinka (1993) also described technological learning as the process by which the enterprises build up their technological capabilities and acquire the skills and knowledge to master production and become competitive. The dynamic component of learning is broad channels of learning, which are: the apprenticeship system of training, on-site training at supplier's factory, on-the-job training within the country, expert contracting, support mechanism provided by public institutions, learning-by-doing production and maintenance,

and learning through transactions with local and external agents Oyelaran – Oyeyinka (1993). Lall (1990) and Bell (1979) categorized learning into three stages. These include: primary, intermediate and advanced learning. The components of elementary learning include, "learning by doing" and "learning by adapting". Learning by doing is seen as a costless process with imported equipment remaining unchanged over time, while efficiency and productivity change as a result of the on-the-job-experience.

The furniture industry in Nigeria finds itself in the first level of Lall's categorization (1987) in learning of doing and learning by adapting. Similar level of learning was observed in the 18th century when industrial revolution started in Great Britain. This was before the establishment of theory-based scientific institutions (Oyelaran-Oyeyinka, 2006).

This industry consumes most of the products from the other sectors. Though there are large establishments, the informal enterprises which are concentrated in this industry when pulled together are more than the formal ones. The industry is well developed and workers within the industry have with time, acquired good skill. Firms within the industry are found both in the formal and informal sectors. Their products are competitive and the capacity is quite adequate. The formal sector can boast of modern and sophisticated equipment while the informal sector relies on rudimentary equipment and hand tools. This sector can boast of good quantity and quality of diverse products (Olufemi, 2005).

In Nigeria the informal sector is seriously expanding, due to the imbalance between job seekers and available job opportunities in the public and private sectors of the economy (Banjo, 1994). Consequently, unemployed individuals are forced to either set up small businesses or seek employment in the informal sector. Hence, the informal sector has continued to play a prominent role in economies by way of income and employment generation activities and techno economic development. It is estimated that in sub-sahara Africa, as much as over 50 per cent of the entire work force is employed in the informal sector (Vandemoortele, 1991, Abumere et al., 1998 and Kajogbola, 1997).

## II. LITERATURE REVIEW

### A. Indigenous learning

Indigenous education is the indigenous transmission of values and its accumulated knowledge in a society. It is a simplistic process of socialization involving the preparation of children for work in the home, village and within a select ethnic domain. It is a means to an end; social responsibility;

spiral and moral values; participation in ceremonies, rituals; imitation; recitation; demonstration; sport; epic; poetry; reasoning; riddles; praise; songs; story telling; proverbs; word games, folktales; puzzles; tongue twisters; dance; music; plant biology; environmental education; and other education-centered activity that can be acknowledged and examined (Itibori, 2001). Semali (1999) says that indigenous learning is about what local communities have known and done for generations; the ability to use community knowledge to produce their needs. It is also what local people know about their environment which must be included in the planning and implementation process of education.

#### B. Learning process

Lall, (1987) identifies six classes of learning process. These processes are:

1. whereby an imported technology is unchanged but its utilization is made more efficient simply through the experience of workers.
2. where small changes are made at the shop floor to raise productivity or to adapt product to particular needs.
3. where imported equipment and processes are replicated and knowledge is gained by design engineers and capital equipment manufacturers of industrial processes.
4. where productivity enhancing changes are made in the design of equipment or products. This may involve scaling down or upgrading of existing designs, adapting designs to local resources, conditions and skills.
5. up complete production systems; it is not just the production capability that is acquired but the capability to engineer and tailor entire factories or plants to specific needs.
6. new processes; where R&D departments or separate research institutions undertake basic research and development (R&D) and are able to offer new processes and to make new products.

#### Theory of Diffusion of Technological Learning (Innovation)

Diffusion of Innovation/Technology is a theory that seeks to explain how, why and at what rate new ideas and technology spread through cultures. This theory was propounded by Rogers in his book published in 1962. According to Rogers (2003), diffusion is the process by which an innovation or a technology is communicated through certain channels over time among the members of a social system. He puts forward four main elements that influence the spread of a new idea: the innovation/technology communication channels, time and a social system. This process relies heavily on human capital. Rogers (2003) stated that "the innovation-diffusion process adopter categorization and rate of adoptions all include a time dimension". He also describes social system which is one of elements of diffusion as "a set of interrelated units engaged in joint problem solving to accomplish a common goal". The diffusion of technology takes place in the social system. In the social system we have social structure that influences the social diffusion. Rogers says that structure is "the patterned arrangements of the units in a system. That is, how individuals / adopters find themselves in different groups of the community social structure. The nature of the social system has impact on the innovativeness of individuals. This is the yardstick used in

categorizing diffusion adopters. Communication channel which is another element of diffusion aids diffusion by encouraging individuals that take part to create and share information with one another in order to reach a mutual understanding (Rogers,2003.p.436).

### III.RESEARCH METHODOLOGY

The furniture making enterprises investigated in the paper covered Lagos, Oyo, Ondo and Ekiti states because furniture making is predominant in these states. Instruments used are questionnaire, personal observation, focus group discussion. The questionnaire was administered on 319 furniture makers to elicit information on the technological learning of the respondents in the industry. It also elicits information on the language used in instructing the apprentices, frequency of consulting books or furniture catalogues for learning and documentation of their experiences,

Focus group discussion was used to ascertain and supplement the information obtained from the questionnaire administered. Both descriptive and inferential statistical techniques are used for data analysis. (Pie chart, percentages, weighted average among others)

### IV.RESULTS AND DISCUSSION

Figure 1 presents methods used by Master Furniture makers to learn furniture works. Majority (91.5%) of the master furniture makers in Nigeria learnt furniture works through apprenticeship. About 2.2% of the respondents learnt furniture works through formal education in the technical colleges and trade centres. The remaining (6.3%) acquired furniture skills through both formal education and on the job training. Apprenticeship is a process of skill formation, is a form of local knowledge institution. It often lasts from a period of about six months to three years and tends to be organised by small firms, although not limited to it (Velenchik, 1995). It is a form of learning in which the learner, in addition to learning a skill from the firm, provides labour services to the firm or the business unit. There is also, 'non-formal' local learning institutions upon which the growth of small firms rely which conventional analysis regarded as inferior to formal learning. This non formal learning is tacit in nature and far more difficult to measure unlike formal learning that is measurable. Tacit knowledge is a bundle of information that is more easily expressed than spoken. It is built from considerable practice and accumulated experience in some narrow tasks, for instance by an apprentice learning from the master (Oyelaran-Oyeyinka, 2006).

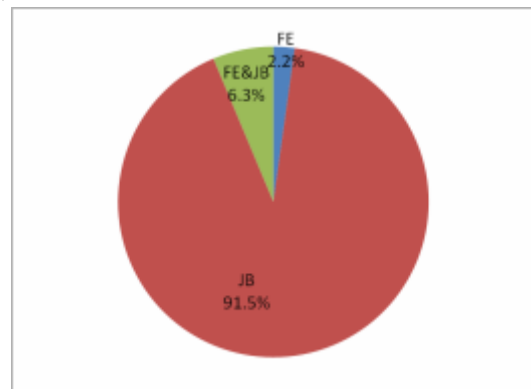


Figure 1. Methods used by Master Furniture Makers to Learn Furniture Works

Source: Field Survey, 2012

Key:

- JT = Apprenticeship on the job training
- FE = Formal education
- JT&FE = Both.

Table 1 presents the result of the duration of time master furniture makers learnt furniture works through apprenticeship. About 67.8% of the respondents claimed to have spent 3-4 years in learning furniture works. another 14.7% of the respondents claimed to have used 2-3 years. Also 14.7% of the respondents used 4 – 5 years in learning furniture works. Few (2.8%) of the respondents indicated that they spent 1 – 2 years in learning furniture works.

Duration	States				Southwestern/ percentage
	Lagos	Oyo	Ondo	Ekiti	
1 – 2 years	2	5	4	-	11 (3.5%)
2 – 3 years	15	8	16	8	47 (14.7%)
3 – 4 years	52	90	36	36	214 (67.1%)
4 – 5 years	6	21	5	15	47 (14.7%)
Total	75	124	61	59	319 (100%)

**Table 1: Duration of learning by master furniture makers on the job training**

Source: Field Survey, 2012

Similarly, Table 2 presents the duration of learning furniture works through formal education by master furniture makers. Out of (2.2%) furniture makers who claimed were trained through formal education, about 57.1% of them spent 2 – 3 years in training while 14.3% of the respondents spent 4 – 5 years. Others who spent 2 – 3 years are 14.3% and the remaining 14.3% used 1 – 2 years to train. The vast majority of African furniture makers have little or no formal education. In essence, they have had to rely more on the non-formal indigenous method of learning which has kept the industry going.

Duration	States				Southwestern/ percentage
	Lagos	Oyo	Ondo	Ekiti	
1 – 2 years	-	-	-	1	1 (14.3%)
2 – 3 years	-	1	3	-	4 (57.1%)
3 – 4 years	-	-	1	-	1 (14.3%)
Above 4 years	-	-	1	-	1 (14.3%)
Total	-	1	5	1	7 (100%)

**Table 2: Duration of learning by master furniture makers through formal education**

Source: Field Survey, 2012

Modes of apprenticeship

Table 3 presents the mode of apprenticeship by the master furniture makers. Majority (93.7%) of the respondents reported that they were not paid salary by their masters during their training periods while some received some stipends. Majority (90.6%) of the master furniture makers collected money from their apprentices for graduation. Some furniture makers did not collect money because the apprentices were masters' relatives or living in the house of masters and rendering other services apart from learning the furniture works. Similar observation

was reported among the auto-mechanics in Southwestern Nigeria (Oluwale, 2011).

S/No	Mode	States				Southwestern/ percentage
		Lagos	Oyo	Ondo	Ekiti	
a(i)	Paid salary by master when learning.	2	4	9	5	20 (6.3%)
(ii)	Not paid salary by master when learning.	73	120	52	54	299 (93.7%)
b(i)	Total Master collected money from apprentice when learning.	75	124	61	59	319 (100%)
		67	114	52	56	289 (90.6%)
(ii)	Master did not collect money from apprentice when learning.	6	10	9	3	28 (8.8%)
		Total	73	124	61	59

**Table 3: Modes of apprenticeship by master furniture makers**

Source: Field Survey, 2012

Table 4 presents the result of language of instruction of the master furniture makers during apprenticeship. Majority (90.0%) of the respondents were trained using Yoruba language as a medium of instruction, while 3.1% and 6.9% were trained using Igbo/Edo and Pidgin English respectively. Comprehension and learning are easier when a person is instructed in his own language. This has been attested to by findings in East Asia where Japanese and Chinese students were first instructed in their own indigenous languages (Ayodele, 2004). Furthermore, Ayodele (2004) observed that in virtually all the advanced countries of the world children are first and foremost educated in their mother tongue. It is therefore quoted (Ayodele, 2004) that: "There is no such thing as a language that promotes the study of medicine, engineering, and law etc. It is most probably that a child would excel in his study if he was introduced to his field of study in his own language".

Language	States				Southwestern/ percentage
	Lagos	Oyo	Ondo	Ekiti	
Yoruba	58	121	52	56	287 (90%)
Igbo/Edo	6	-	4	-	10 (3.1%)
Pidgin English	11	3	5	3	22 (6.9%)
Total	75	124	61	59	319 (100%)

**Table 4: Language of instruction used by master furniture makers**

Source: Field Survey, 2012

Table 5 shows knowledge diffusion among master furniture makers. Majority (73%) of the respondents did not work in formal furniture companies before setting up their workshops while 27% of the respondents worked in furniture companies before setting up their workshops. It is also shown on the table that 87.5% of the respondents had never worked in any

furniture company before starting their furniture workshops. But 12.5% claimed to have worked in private furniture workshops before setting up their own workshops.

From time in memorial, knowledge and experience gained in learning flow from country to country, region to region and even community to community. This flow of knowledge, which is usually referred to as knowledge diffusion, occurs in all industries including furniture making industry. some of the master furniture makers in this study had worked in furniture companies (27%) and private workshops (12.5%) before setting up their own workshops. the knowledge they acquired from such companies and privates/workshops becomes useful when they are on their own.

S/No.	Categories	States				Southwestern/ percentage
		Lagos	Oyo	Ondo	Ekiti	
1(a)	Furniture Maker that work in furniture company before setting up workshop.	23	32	19	12	86 (27%)
(b)	Furniture Maker that did not work in furniture company before setting up workshop	52	92	42	47	233 (73.0%)
		75	124	61	59	319 (100%)
2(a)	Total					
(b)	Furniture Maker that work in a privately owned furniture workshop before setting up his own workshop	9	16	6	9	40 (12.5%)
		66	108	55	50	279 (87.5%)
(b)	Furniture Maker that did not work in a privately owned furniture workshop before setting up his own	75	124	61	59	319 (100%)
Total						

**Table 5: Knowledge diffusion among master furniture makers**

Source: Field Survey, 2012

Table 6 presents factors that aided apprentices' learning. These factors rated on a 5-point likert type scale were age, sex, education, language of instruction and period of apprenticeship. The respondents strongly agreed that male (4.9), learnt better than female. This is probably because there was no female respondents in the study area. Furthermore the respondents agreed that native language (4.1) and financing (4.0) the apprentices aid learning and their ratings were significantly the same.

It can thus be inferred that male apprentice, education, use of native language and adequate financing of the apprentices adequately aided learning in the furniture industries. These factors have their mean ratings above 4 points as to by agreed respondents. This is in line with the learning theory that says if an economy uses local language (dialekt) in educating citizens, they quickly understand. According to Raham (2011) reported that children who were taught in their own language understand concepts better and actually learn the other language they are taught later than those who start their schooling in an alien language. He also found that even in mathematics those who are given mother language education are better learners. Some of the furniture makers believed that male apprentices are more suitable for furniture works. This is because furniture works request more energy put into it than other works.

Similarly, the respondents partially agreed with other factors, such as younger apprentices learn better (3.7), staying longer to learn (3.6), people with tertiary education learning better (3.6) than people with technical education, people with primary education, people with primary education learning better (3.5) than people without education, old people learn at a low rate than young apprentices (3.4) and people without education (3.2) had extended learning period compared with people with education (3.5) are significant the same.

Factors		SA 5	A 4	PA 3	D 2	SD 1	WA
AGE	F	61	126	107	18	4	
Younger apprentices learn better (below 18) than old apprentices.	%	19.2	39.9	33.9	5.7	1.3	
	FX	305	504	321	36	4	3.7
Old apprentices learn at low rate than younger apprentices	F	50	110	116	27	1	
	%	18.1	34.5	38.2	4.9	0.3	
	FX	250	440	348	54	1	3.4
SEX	F	220	61	19	3	4	
Male apprentices learn better than female.	%	71.7	19.9	6.2	0.9	1.3	
	FX	1100	244	57	6	4	4.9
Female apprentices learn better than male apprentices.	F	34	43	91	40	48	
	%	12.6	16.0	33.8	15	17.	
	FX	170	172	273	80	8	2.8
PERIOD	OF	54	126	90	29	3	
APPRENTICE	%	17.6	41.0	29.3	9.4	1.0	
Staying longer at work means knowing better.	FX	270	504	270	58	3	3.6
Staying shorter at work means knowing better.	F	10	73	100	71	25	
	%	3.4	24.7	33.9	24.	8.5	
	FX	50	292	300	1	25	2.7
EDUCATION	F	64	89	84	38	19	
People with tertiary education learn better than people with technical education	%	21.9	30.5	28.8	13.	6.5	
	FX	320	356	252	0	19	3.5
People with technical education learn better than people with secondary education	F	139	82	48	20	8	
	%	47.3	27.6	16.2	6.7	2.7	
	FX	695	328	144	40	8	4.1
People with secondary education learn better than with primary education	F	34	40	99	20	11	
	%	16.7	19.6	48.5	9.8	5.4	
	FX	170	160	297	40	11	3.5
People with primary education learn better than people without education	F	29	120	115	25	9	
	%	3.8	40.3	38.6	8.4	3.0	
	FX	145	480	345	50	9	3.5
People without formal education extends their learning period	F	38	107	83	48	14	
	%	13.1	36.9	28.6	16.	4.8	
	FX	190	428	249	6	14	3.2
Financing of the apprentices	F	140	65	60	20	10	
	%	47.5	22.0	29.3	6.8	3.4	
	FX	700	260	180	40	10	4.0
Native language aids learning.	F	264	29	8	2	5	
	%	85.7	9.4	2.6	0.6	1.6	
	FX	1320	116	24	4	5	4.8

**Table 6: Factors that aid apprentices' learning as perceived by master furniture makers in Southwestern Nigeria**

Key:

F = Frequency of occurrence of each factor

% = This frequency of each likert point over the population sample of the study

Fx = Frequency multiple by likert value.

Strongly agreed (SA) = 5,  
Agreed (A) = 4,  
Partially agreed (PA) = 3,  
Disagreed (D) = 2,  
Seriously disagreed (SD) = 1,  
Undecided (U) = 0.

Source: Field Survey, 2012

Summary, Conclusion and Policy Recommendations

This paper examined the factors influencing technological learning in the furniture industry in southwestern Nigeria. The paper covered Lagos, Oyo, Ondo, and Ekiti states because of the predominance of the industry in these locations selected. The population size consisted of 319 furniture makers. The research instruments used were questionnaire, personal observation and focus group discussion approaches. The questionnaire was administered on master furniture makers and elicited information on the factors influencing technological learning in furniture industry. It also elicited the language of instruction in the industry.

The results of the research show that the technological learning of the furniture makers was based on the job training (91.5%) apprenticeship. Majority (67.8%) of the correspondents spent between 3 – 4 years in learning furniture skills. Similarly, 14.7% of the furniture makers spent 2 – 3 years in learning furniture skills while 2.8% spent 4 – 5 years.

The language of instruction was majorly Yoruba which enhances their learning Knowledge and those factors that encouraged learning were education, age, period of apprenticeship and financing of the apprentices either try government or their relations.

#### V.CONCLUSION

The paper concluded that technological learning in furniture making industry was based on the job training that is in formal. However, there was little formal training in the training centres in the selected states. It also concluded that there was little or no linkage between the industry and knowledge institutions and providers of technical support service.

#### VI.RECOMMENDATIONS

Both local and national furniture/carpenters' associations should encourage their members to form clusters and partake in establishing cooperative societies. They should also patronize financial institutions for soft loans to expand their businesses. State and local government should encourage furniture makers in their domains to establish cluster villages where member firms could derive maximum benefits from agglomeration. This idea will no doubt enhance knowledge diffusion, technological capability development and Innovations among the entrepreneurs. If the above recommendations are implemented, it will enhance productivity, innovation and technological positively capability of furniture industry. It will also impact on employment opportunities and welfare of the Nigerians.

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