

Ranking Polyvinyl Acetate Adhesives and Nitro-Cellulose Clear Varnishes Available in the Kenyan Market

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Abstract

A survey was conducted to document the Polyvinyl Acetate adhesives and Nitro-cellulose varnishes available in the Kenyan market. Furniture sellers, dealers in related hardware and furniture manufacturers from large-scale and small-scale firms were surveyed. Ten from each category of firms were selected and interviewed through structured questionnaires to allow ranking of available adhesives and paints. The number of sellers and furniture manufacturers found selling or using a given product was recorded and used to analyse the opinion of these sellers and users on the performance of the products. Results on the relationship between perceived performance and product price showed that large and small-scale sellers had similar preference for four brands of adhesives and six brands of paints. These brands enjoyed users' confidence, having been in the market for a long time. Furniture manufacturers in large and small-scale sectors shared similar opinion on the performance of the four adhesive brands but their opinion on the performance of the four paint brands was significantly different. There was a strong relationship between price and perceived performance of both adhesives and paints. Brands perceived to have good quality were more expensive than newer and less known ones. The documented brands of adhesives and paints were ranked based on the perceived performance since none bore an indicator of quality such as the Kenya Bureau of Standards mark of quality. It was recommended that these products be subjected to strength testing to enable objective ranking based on actual performance

KEY WORDS: Adhesives, Furniture, glued joints, polyvinyl acetate, varnishes

Introduction

The demand for furniture in Kenya increases with increasing population, especially in urban centers due to the rural urban migration (Borretti, 1990). The need for more office space and housing creates great demand for furniture of varying designs and quality due to the various income groups (Muthike and Ndegwa, 1996). The industry is however faced with stiff competition from imported furniture from especially Italy, other parts of Europe and Southern Africa, especially targeting high income buyers. Although data on the exact volumes of furniture manufactured locally was unavailable due to the informal nature of the furniture sector in Kenya, majority of furniture outlets targeting high and middle income earners stock imported furniture especially the so called “knocked down designs’.

One way to counter this is by local furniture manufacturers understanding the available alternative materials to enable cost-effective production of high quality furniture. Adhesives are important in joinery and play a very important role in making value added products from potential wastes and residues in furniture workshops (Chikamai, et al, 1996). Vanishes on the other hand improve the aesthetic value of the furniture, providing some chemical, physical and to some extent mechanical protection to the surface. Both adhesives and varnishes take 20 – 30 percent of the total material cost for hard wood furniture and 15-25 percent for furniture made of soft woods and constituted boards (Toda, 1996). The best of these attributes in adhesives and varnishes depend to a large extent on the quality of the adhesives and varnishes (Chikamai, et al, 1996). The most common adhesives and varnishes in furniture industry are Polyvinyl acetate (PVA) glues and Nitrocellulose vanishes.

There is a wide variety of PVA glues and nitro-cellulose varnishes for wood on the Kenyan Market. Some of them have been in the market for a long time and are therefore well known to users. However, new ones are being introduced every time, but due to lack of documented record of their performance, users have not been keen to try them. This has denied furniture manufactures the opportunity to take advantage of the new brands which could be either cheaper or of better performance. Due to this, manufacturers of

these well known brands have been increasing their prices making them uneconomical to small-scale furniture manufacturers, whose end products are targeted to low income earners. This research aimed at documenting and ranking the available brands of adhesives and varnishes based on users' perception of their performance and price.

Objective

To document and rank the brands of PVA glues and Nitrocellulose varnishes available in Kenya based on users' perceived performance and price.

Research Methods

A survey was carried out in large and small-scale furniture workshops as well as sellers of furniture making hardware in five representative urban centres, Nairobi, Mombasa, Eldoret, Kisumu and Nakuru. The number of firms sampled was based on intensity of furniture making activities after the initial guided survey of each town.

For the purpose of this study, material inputs, level of technology and level of output were the criteria used to differentiate between large-scale and small-scale furniture manufacturers. Large-scale firms comprised those with timber input of about 500 cubic metres per year and above, while those below this were considered small-scale. Hardware sellers were also classified based on their level of stocking and target market for their stocks. Large-scale hardware distributors were those with large stocks and whole-selling to other sellers to retail, while small-scale sellers were those selling in pieces to general users. The number of sellers sampled in each town was expressed as a percentage of the total number of firms surveyed as shown in Table 1.

Table 1. Adhesive and Paint Sellers and furniture manufacturers surveyed in various towns in Kenya.

<i>Town</i>	<i>Sellers</i>				<i>Furniture Manufacturers</i>			
	<i>Large Scale</i>		<i>Small Scale</i>		<i>Large Scale</i>		<i>Small Scale</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Nairobi	4	40	10	33	7	70	20	50
Eldoret	2	20	6	20	-	-	6	15
Nakuru	2	20	6	20	1	10	5	13
Kisumu	1	10	4	14	1	10	5	13
Mombasa	1	10	4	14	1	10	4	10
<i>Total</i>	10		30		10		40	

Firm proprietors and sales personnel in large and small-scale sectors were interviewed on customer preference and prices of adhesives and paints using a structured questionnaire. Furniture manufacturers were also interviewed on their preferences for these products and the reasons for their choices. The information about products was recorded in the questionnaire sheets and categorized depending on the number of firms stocking or using the product and whether this was due to performance or price incentives. Data was statistically analysed using Kruskal-Wallis statistical test method to determine the differences in opinion of large-scale and small-scale sellers and furniture manufacturers based on product performance. Trend curves were used to highlight the relationship between performance and price rankings of the products.

Results and Discussions

Documentation and Ranking of Adhesives and Paints

Results showed that twelve manufacturers of PVA adhesives and eleven of varnishes had their products on the Kenyan market. Some manufacturers had more than one product with different brand names and prices. In such cases, users could be confused and assume the brands with higher prices reflected better performance. Although there are Kenyan standards for adhesives specification (Kenya Bureau of Standards, 1996)

and adhesives, paints and varnishes testing (Kenya Bureau of Standards, 1985), none of the products found on the market had the sign of quality given by the bureau. Existing users indicated that they make their choices based on past experience. New and inexperienced users, however experience difficulty in making their choices. To some, more expensive brands could reflect possible better performance.

Adhesives

Sellers

Small-scale sellers had a wider variety of brands since they serve mainly the small-scale furniture manufacturers whose choice is wider. There were however, four brands of adhesives commonly available on the shelves of both the large-scale and small-scale sellers. These are the brands that have been in the market for long and have become popular in both sectors. Although they were found in a wide range of packages in the large-scale sector, most of the small-scale sellers stocked them in small packages of ½ and ¼ kilogram. Newer brands seemed to attract majority of small-scale sellers due to their lower prices.

Furniture Manufacturers

The large-scale furniture manufacturers were using different systems in the purchase of materials. Out of the ten manufacturers visited, four used the tender system, two purchased from sellers well known to them while four bought from any seller as long as they could get the materials in right quantities and at fair prices. In all the firms, the choice of materials was narrow and mainly based on past experience on perceived strength performance of the adhesive. Although the furniture manufacturers visited did not have any way of testing the adhesives for possible changes in formulation, which is a major factor affecting their strength performance (Tsoumis, 1991, Mutuku, 1982 and Marra, 1992), majority of them indicated their unwillingness to try new brands for fear of poor performance.

Not all small-scale furniture manufacturers were specific on where to purchase adhesives. Some made their choices based on past experience on performance, others on price while others purchased whatever was available. In all the towns except Nairobi, some of the brands of adhesives were said to be sometimes scarce. This forced furniture manufacturers to buy any available brand to maintain their production.

A ranked list of adhesives based on number of sellers who had them on their shelves is shown in Table 2. The small-scale sellers had a wider variety of adhesives. They based their stocks on the demand expressed by buyers, majority of whom were small-scale furniture manufacturers.

A ranked list of adhesives based on number of furniture manufactures who used is shown in Table 3. Furniture manufacturers in this sector are in two main groups. Those that serve clients in the middle and high income group tend to insist on using good quality adhesives based on experience. Those that serve low-income clients buy cheaper brands for their production.

Table 2: Ranked adhesive brands based on sellers' opinion

<i>Rank</i>	<i>Adhesive (Brand names)</i>	<i>Large Scale (Performance)</i>		<i>Small Scale (Performance)</i>		<i>(Price)</i>	
		<i>Freq.</i>	<i>(%)</i>	<i>Freq.</i>	<i>(%)</i>	<i>Freq.</i>	<i>(%)</i>
1	Ponal Professional Glue	10	100	28	93.3	2	6.7
2	Ponal Mitiplast White Glue	8	80	27	90.0	4	13.3
3	London Adhesive	6	60	26	86.7	6	20.0
4	Dowel Glue	5	50	24	80.0	7	23.3
5	Crown Glue	-	-	25	83.3	3	10.0
6	Maroo Glue	-	-	22	73.3	9	30.0
7	Supa Bond	-	-	20	66.7	9	30.0
8	Super Mac Glue	-	-	15	50.0	11	36.7
9	Perfect White Glue	-	-	12	40.0	13	43.3
10	Mbao Stick	-	-	5	16.7	15	50.0
11	Apex Wood Joinery Glue	-	-	6	20.0	15	50.0
12	Woodex Glue	-	-	4	13.3	20	66.7
	<i>Totals</i>	10		30		30	

Table 3: Ranked adhesive brands based on furniture manufacturers

Rank	Adhesive (Brand names)	Large Scale (Performance)		Small Scale (Performance)		(Price)	
		Freq.	(%)	Freq.	(%)	Freq.	(%)
1	Ponal Professional Glue	8	80	32	80	2	5.0
2	Ponal Mitiplast White Glue	7	70	28	70	3	7.5
3	London Adhesive	5	50	24	60	5	12.5
4	Dowel Glue	1	10	22	55	6	15.0
5	Maroo Glue	-		18	45	9	22.5
6	Crown Glue	-		18	45	7	17.5
7	Supa Bond	-		17	42.5	11	27.5
8	Super Mac Glue	-		17	42.5	12	30.0
9	Perfect White Glue	-		14	35	15	37.5
10	Mbao Stick	-		10	25	19	47.5
11	Apex Wood Joinery Glue	-		9	22.5	21	52.5
12	Woodex Glue	-		6	15	25	62.5
	<i>Totals</i>	10		40		40	

Table 4 shows results of Kruskal-wallis test for any differences in the opinion of large-scale and small-scale sellers of adhesives. The critical H- test statistic at $p = 0.05$ is 3.84

Table 4: Statistical analysis of sellers' and manufacturers' opinion on adhesives

Firm	Category	Preference opinion indicator	Actual H-Test statistic	Critical H-Statistic
Sellers	Large and Small-scale	Performance	1.08	3.84
Manufacturers	Large and Small-scale	Performance	0.33	3.84

Statistical analyses show that large-scale and small-scale sellers had similar opinion on the performance of the four adhesive brands. This indicates that manufactures perceived the brands as of good quality. Some of these brands were, however expensive and attracted only a few small-scale artisans, especially those making high quality furniture.

Majority of small-scale furniture manufacturers purchased brands that their customers could afford. Brand price was important in these cases. Figure 1 illustrates trends on adhesive ranks based on performance and price criteria.

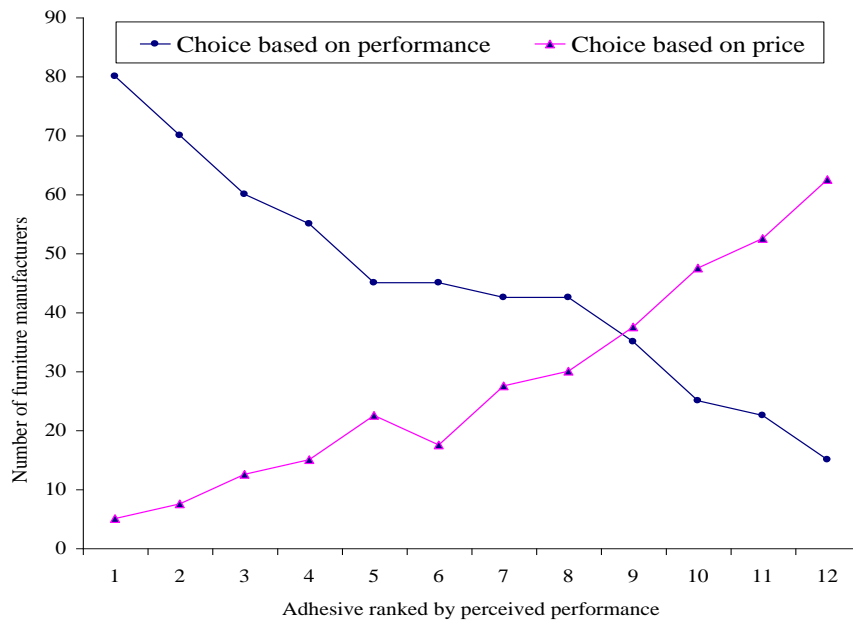


Figure 1: Adhesives Performance and price Relationship opinion by sellers
 By plotting the number of users choosing a brand based on either good performance or price, inverse trends were observed between performance and price. This shows that the more expensive brands, though perceived to be good in quality attracted fewer users. These are mainly those in the first category. On the other hand, cheaper brands attracted more users in the small-scale sector although their performance was not good. These users comprised of those serving low-income clients. Large-scale furniture manufacturers based their choices purely on past experience in performance irrespective of the price.

Paints

Sellers

There were six brands of nitro-cellulose paints commonly available on the shelves of both the large-scale and small-scale sellers. There were four brands of nitro-cellulose paints common with both large and small-scale furniture manufacturers. A ranked list of paints based on number of sellers who had them on their shelves is shown in Table 5.

Table 5: Ranked paint brands based on sellers' opinion

Rank	Paint (Brand names)	Large Scale (Performance)		Small Scale (Performance)		(Price)	
		Freq.	(%)	Freq.	(%)	Freq.	(%)
1	Alfa Automotive Finish	10	100	29	96.7	9	30.0
2	Sadoline Clear Finish	4	40	15	50.0	10	33.3
3	Solai Wood Finish	4	40	14	46.7	12	40.0
4	Apex Automotive Finish	3	30	12	40.0	13	43.3
5	Robiallac Wood Finish	2	20	7	23.3	17	56.7
6	Apex Wood Finish	-		16	53.3	19	63.3
7	Pinnacle Wood Finish	-		15	50.0	22	73.3
8	Alfa Coate Wood Finish	-		15	50.0	20	66.7
9	Basco Clear Finish	-		12	40.0	26	86.7
10	Blue Seal Wood Finish	-		6	20.0	27	90.0
	<i>Totals</i>	10		30		30	

A ranked list of paints based on number of manufactures who used them is shown in Table 6 .

Table 6: Ranked paint brands based on furniture manufacturers.

Rank	Paint (Brand names)	Large Scale (Performance)		Small Scale (Performance)		(Price)	
		Freq.	(%)	Freq.	(%)	Freq.	(%)
1	Alfa Automotive Finish	4	40	34	85	3	7.5
2	Sadoline Clear Finish	3	30	31	77.5	5	12.5
3	Solai Wood Finish	2	20	31	77.5	6	15.0
4	Apex Automotive Finish	2	20	29	72.5	10	25.0
5	Robiallac Wood Finish	-		28	70.0	8	20.0
6	Apex Wood Finish	-		30	75.0	6	15.0
7	Pinnacle Wood Finish	-		26	65.0	12	30.0
8	Alfa Coate Wood Finish	-		20	50.0	11	27.5
9	Basco Clear Finish	-		11	27.5	16	40.0
10	Blue Seal Wood Finish	-		7	17.5	21	52.5
	<i>Totals</i>	-		5	12.5	25	62.5

Table 7 shows results of Kruskal-wallis test for any differences in the opinion of large-scale and small-scale sellers of paints. The critical H- test statistic at $p = 0.05$ is 3.84.

Table 7. Statistical analysis of sellers' and manufacturers' opinion on paints

Firm	Category	Preference opinion indicator	Actual H-Test statistic	Critical H-Statistic
Sellers	Large and Small-scale	Performance	0.69	3.84
Manufacturers	Large and Small-scale	Performance	5.33	3.84

Large-scale and small-scale sellers' opinion on the performance of the six paint brands was not significantly different. The results on seller's opinion indicate that these brands were popular to both large and small-scale sellers and majority of users have known them.

However, due to their high prices, they attracted fewer buyers in the small-scale sector. Some small-scale sellers therefore feared stocking them, as they could become dead stocks.

Furniture Manufacturers

Large and small-scale furniture manufacturers differed significantly in their opinion on the performance of paints. The quality of paints according to many of the furniture manufacturers especially in the small-scale sector is determined by drying time, furniture surface smoothness and shininess. Those in the large-scale sector considered, among other factors, the length of time the furniture would retain a shiny surface while in use. Large-scale furniture manufacturers particularly complained of poor paint retention on the furniture surface while in use. These differences in performance assessment methods adopted could have caused the difference in opinions. In all the firms, the choice of materials was narrow and mainly based on past experience on strength performance and shininess of the varnishes.

Although the furniture manufacturers visited did not have any way of testing the paints for possible changes in formulation, which is a major factor affecting their strength performance (Tsoumis, 1991), majority of them indicated their unwillingness to try new brands for fear of poor performance. On the other hand, most of the other factors like wood properties that affect the performance of paints (Miyata, 1994, Toda, 1996 and Tsoumis, 1991) are usually not taken into consideration when choosing the paint.

A number of small-scale furniture manufacturers were not specific on the criteria for purchasing paints. As a result, their choices were based on combined criteria especially where there was scarcity of paints in areas outside Nairobi. Consequently they bought any available brands to maintain their production. Figure 2 illustrates trends on paints ranks based on performance and price criteria.

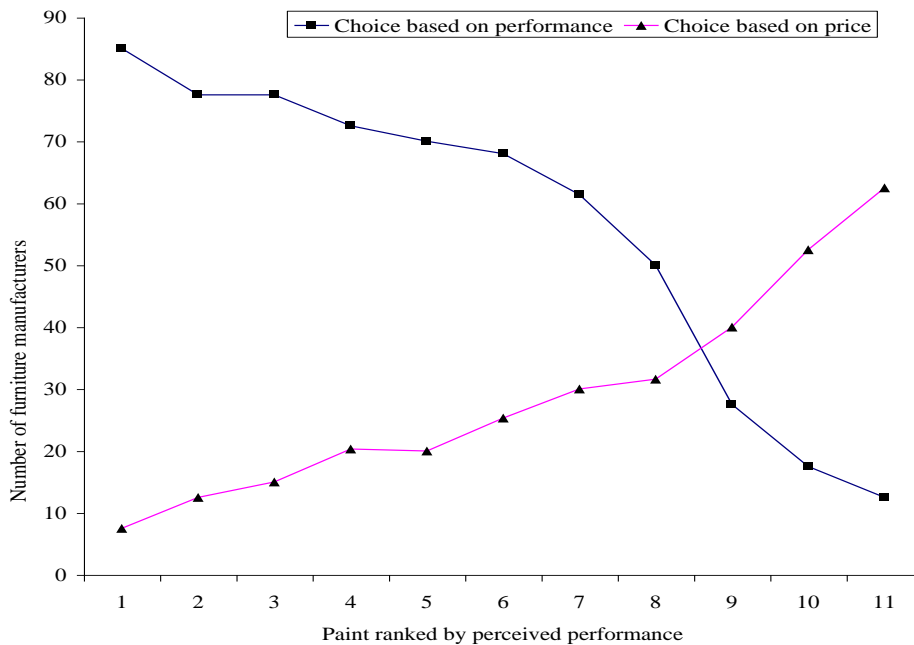


Figure 2: Paints Performance/ Price Relationship opinion by Furniture Manufacturers

These trends are similar to those in Figure 1 and the implications of these findings are similar to those explained for adhesives. This meant that some small-scale sellers were afraid of stocking expensive paints that would be unaffordable by their customers leading to dead stock and wastage.

Conclusions and Recommendations

Conclusions

- Furniture manufacturers are faced with a wide range of adhesives and paints but without clear information on the expected performance. Past experience on actual or perceived performance and price of these products have been the major criteria used in ranking. Although this is still important, it may not be very accurate.
- Lack of information on performance hinders furniture manufacturers from trying new brands.
- Paints for wood finishing are reported to be almost the same in terms of drying time and surfaces quality, except a few. Their retention capacity on the wood surface is however, not clear.

Recommendations

- The Kenya Bureau of Standards should give clear certification of these products to protect the users from sub-standard products.
- The available brands should be subjected to laboratory strength tests to rank them based on performance.

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