Original Research Article

UNDERSTANDING CONSUMERS' PERCEPTIONS OF WOOD QUALITY ASSESSMENT IN MULTAN, PUNJAB, PAKISTAN

ABSTRACT

Quality assessment regarding purchase of wood and wood-based products is inevitable to protect consumers for incurring losses. The present research was focused to enable consumer to assess quality woods. Questionnaire containing qualitative and quantitative information were prepared and face-to-face interviews were conducted. Respondents were selected by using purposive sampling technique. Data was gathered from 120 respondents, operating in Multan city, Punjab, Pakistan, and analyzed using SPSS-21 software. The study was conducted using survey research which is accomplished in three steps namely (1) questionnaires were assembled; (2) respondents were selected using purposive sampling and kept sample size as 120; (3) interviews were conducted using a well-constructed questionnaire containing wealth of quantitative and quantitative information. Variables used for quality assessment were durability, resistance to splitting, elasticity, hardness, color and weight. Results revealed that regarding choice of species for furniture making, *Dalbergia sissoo* and *Cedrus deodara* were equally most preferred species while *Eucalyptus camaldulensis* and *Mangifera indica* were least preferred based on perceived quality assessment indicators. Wood design is perceived as more effective factor in choice of wooden furniture. Respondents' self-reports identified wood breakage as main problem mostly occurred between 2-10 years of furniture use and furniture replacement followed by repair and polish are reported as possible solutions. Regarding safety and economic use, trucks were considered efficient in wood transportation especially in bulk quantity and for transportation to shorter distances, motor cart remained preferred for economic reasons. It was concluded to develop wood quality standards for raw wood and furniture for easy choice for quality woods and furniture.

Keywords: Wood problems, furniture, transport, preservatives, economics.

1. INTRODUCTION

Quality is assessed by various indicators including strength, durability, elasticity, color, exemption from defects and diseases. Many products can be obtained from wood and countries are earning substantial gross domestic product (GDP). Wood can be utilized for multipurpose like fuel, furniture, construction, sports, shipbuilding, children's toys, among

others. About furniture, among many top furniture producing and selling countries, China is leading mainly importing to Japan, Hong Kong, European Union and North America and earning US$55.26 billion, which is 18% of total world production [1].

The presence of woods evident in worldwide society, and countries are stabilizing their economies by establishing business in exportation and importation of furniture. China, Austria, Russia, Germany, Finland, Sweden, US, Canada are among top exporters of wood and wood products [2]. Therefore, to improve the business it is necessary research and information about basic tips and/or knowledge to judge quality timber.

Choice of wood and quality is stemmed from prevalent defects that raw and finished material carries. Before harvesting, species, age, growth conditions and wood properties are good indicator and information to understand wood quality, whereas, when harvested tree is sawn, knots, wane, shakes and cracks, fungal diseases, decay, split sand insect pests [3,4,5]. FhThe consumers have choices, preferences and demands for some woods mostly depends things like lifestyles, income level and status [6]. People who are cautious about wood choice and quality spend sufficient times in purchasing keeping in mind their compatibility with the environment and no hazards issue arises. However, Moreover, common consumer is not sufficiently aware of quality indicators of wood and furniture purchase, but also have limited awareness of wood problems a corresponding price decrease.

Consumer's preferences mostly determined by the clean and clear surface, color and esthetic features [6]. By doing so various wood defects especially knots can be overlooked [7,8,9]. Hence, consumer perspective coupled with quality choice would not only allow them for a broader choice, but an opportunity to invest with more security in wood materials.

To safeguard consumer interest, the present research is formulated aiming to understand local consumer and wood assessment of wood quality in Multan, Pakistan. The information will be helpful to identify gaps for better choice and quality for consumers.

2. METHODOLOGY

2.1. Study Area

The present research was conducted in Multan city, located in Pakistan's Southern Punjab with longitudes 71.5249° E and latitudes 30.1575° N. It is the seventh largest city of Pakistan and is situated between north latitude 29°22' and 30°45' and east longitude 71°4' and 72°4'55'' at about 215 meters above sea level [10]. According to provincial results of 2018 census, the population of Multan is 1,931,000 and total area is 1300 km^2. It has arid climate with hot summers and cold winters. The average monsoon rainfall for Multan is 119.7 millimeters (4.71 inches). Timber market is located to the south-east of central part and on both sides of Vehari road of city of Multan.

It is a major center and a great hub which entertains timber and furniture buyers with quality and variety of furniture and timber in reasonable rates and prices. It supplies timber and furniture to distant places. Multan is rich in inhabiting a diversity of fauna and flora [10]. Fauna includes all animal (micro-organisms, wildlife, domesticated life) while flora includes crops, trees, forage, among others. It grows both winter (*Rabi*) and summer (*Kharif*) crops including wheat and some fodder like maize and Egyptian clover and whereas cotton, rice, and fodder (mainly maize and sorghum) crops respectively, and sugarcane [11]. Fruit orchards for instance mango, the king of fruits is grown in orchards successfully and are famous internationally. Ethno-pharmacological species like *Calotropis procera*, *Sonchus arvensis, Chenopodium album, Saueda fruticosa, Salsola foetida* and *Cynodon dactylon* are also present in Multan district [12]. The most common and commercialized tree species in the district are *Dalbergia sissoo*, *Vachellia nilotica*, *Syzygium cumini*, *Melia Azadirach*, *Azadirachta indica*, *Abizzia lebbek* etc. Wood market also carries species from upland areas as well as exported from outside Pakistan namely *Cedrus deodara*, *Abies pindrow*, VN= *Vachellia nilotica and .Pinus wallichiana*

2.2. Research design

The research was conducted using both qualitative and quantitative techniques. "Cross sectional survey" (in which data is taken from a sample in same point of time) was undertaken.

Surveys were conducted and questionnaires were administered from consumers and wood workers by face-to-face interviews to avoid confusion in understanding, reducing refusal rates, gaining highest response, and highest cooperation. Questionnaires carry both open and close ended questions to get comprehensive knowledge about asked questions. Most of the questions were incorporated after consultation with wood traders, wood workers and wood suppliers, however, they were not part of the respondents.

2.3 Sampling Techniques and Respondents Selection

Researchers select a population, then they choose sample, collect data, and infer results from sample. So, did executed in present research, survey is accomplished in following three steps: (1) questionnaires were assembled; (2) respondents were selected using purposive sampling and kept sample size as 120; (3) interviews were conducted.

2.4 Data Collection Instruments and Procedures

To get perceptions of common people about quality indicators, defects and solutions, questionnaires carried optimum questions about socio-economic variables, quality parameters, defects and their solutions, wood preferences for making products like furniture/doors/windows and transport issues. The questionnaires contain structured, semi structured, and open-ended questions. Respondents were taken their consent whether they wanted to be part of study or not, after that face-to-face interview were taken and the gathered information was filed in questionnaires for later analysis.

2.5 Statistical Analysis

Data were analyzed using SPSS-21 software, and in order to determine responses into various categories, descriptive analysis using percentages were applied.

3. RESULTS

3.1. Factors effecting choice of woods

There are several cognitive prospects behind choice of wood and that might be affected by many discrete reasons such as socio-economics and environment. There are several reasons that effect choice in selecting wood or timber, as demonstrated in Figure1. Majority (37%) claimed “design”, followed by 30% who mentioned “wood or wood type” while only 3% cited “price” as the factor that effected their selection.

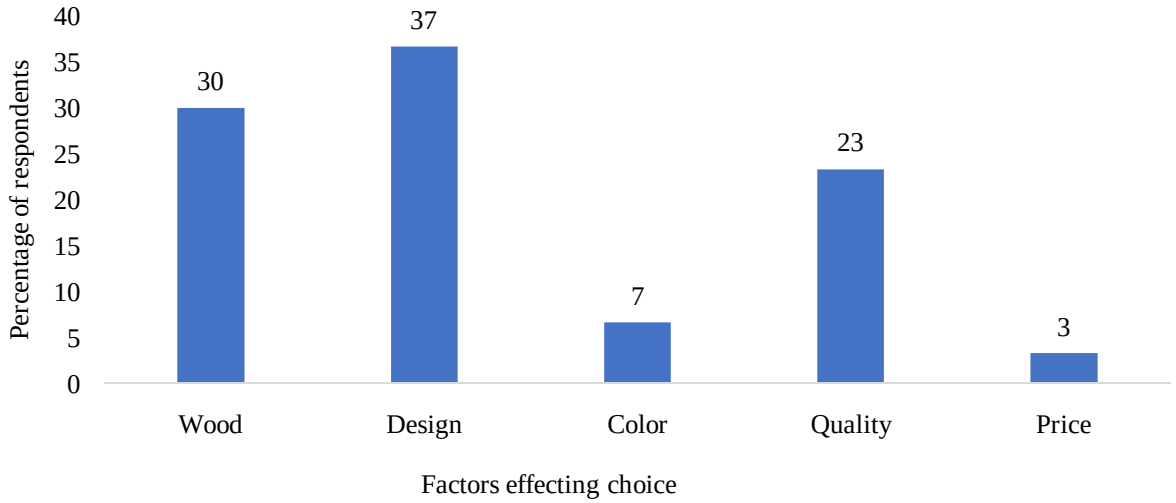

Figure 1: Factors effecting wood’s choice by respondents.

3.2. Problems occur in wooden furniture

Imperfection is the part of nature and wood, and wooden products are also constituents of nature. The Figure 2 displayed types of wood problems faced by the respondents, 20% of the respondents threw spotlight on problems like breakage, 10% believe shakes and shrinkage are serious wood problems, 13% each attributed to insect attack and wood twist whereas 30% did not furnish any opinion.

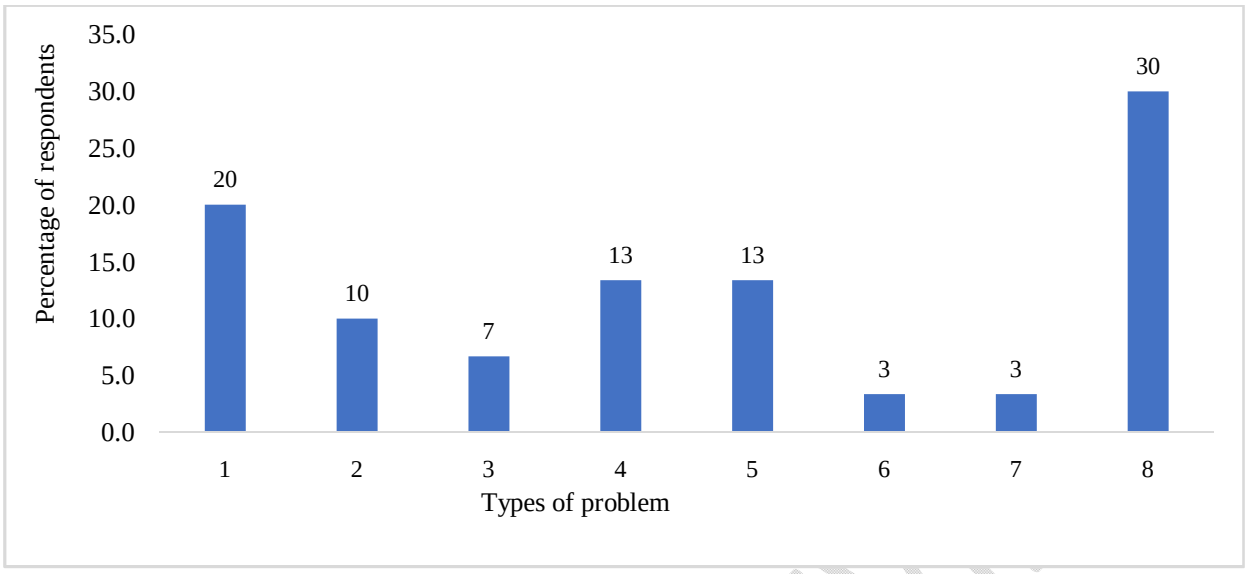

Figure 2: Types of problems. Where: 1= Breakage 2=Occurrence of shrinkage and shakes 3=Twist and breakage 4=Insect, termite attack 5= Twist, breakage and termite attacks 6=Swelling7=Tweaky sound 8= No opinion.

The Figure 3 showed that most of the respondents (37%) commented that their wooden product (furniture/door/windows) faced problem during time interval of 2-10 years, following by 16% who mentioned time period of 11-20 years of problem occurrence. However, 33% came up with no opinion.

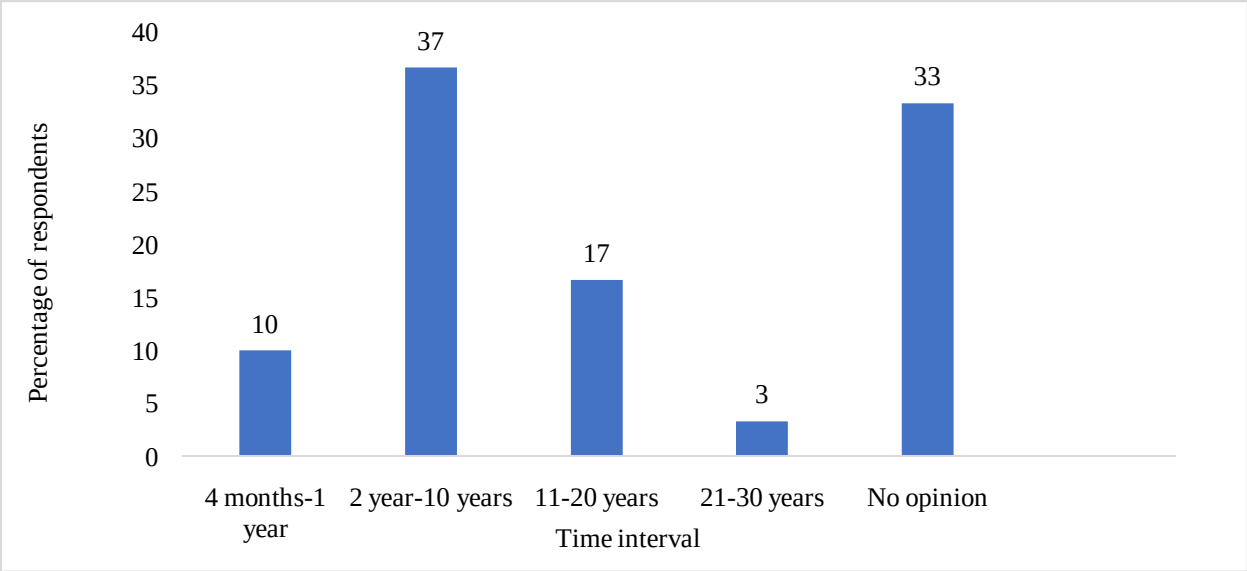

Figure 3: Time period from purchase to defect arose.

The Figure 4 manifest types of woods exhibiting defect or problems. Respondents (20%) claimed defects in *C. deodara* and *D. sissoo* each, it is interesting to note these two woods are also designated as best woods for furniture followed by *E. camaldulensis* (10%) whereas *V. nilotica*, *M. azedarach, S. cumini, V. nilotica* and *P. walliciana* showed minimum defects. This might be due to the reasons that since most of the respondents were in use with *C. deodara* and *D. sissoo*, therefore can encounter maximum problems.

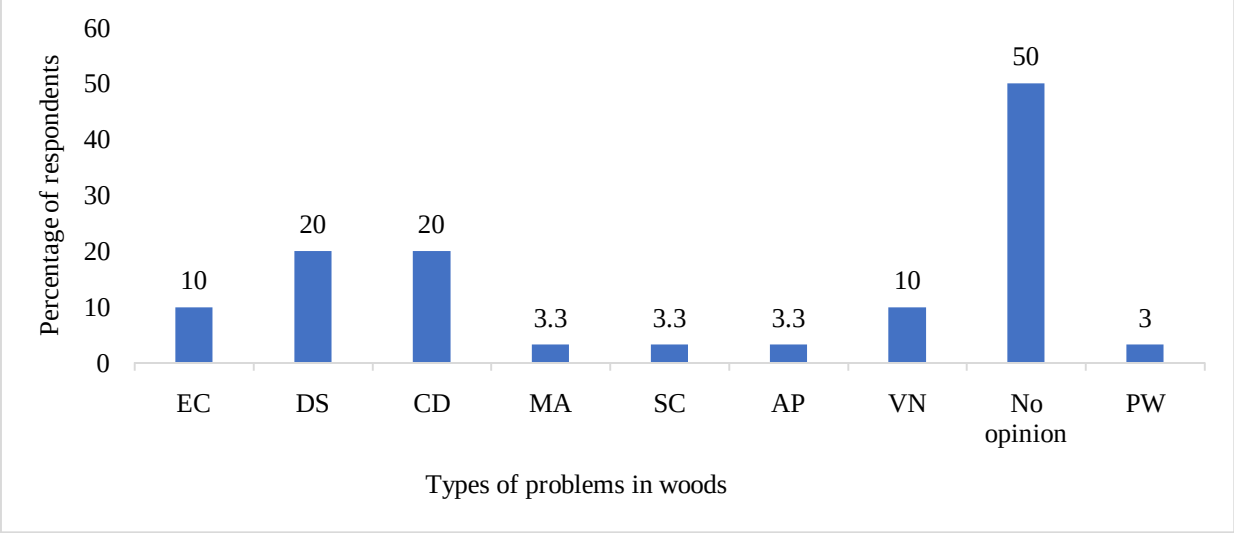

Figure: 4: Perception of respondents about defected woods. Where: EC= *Eucalyptus camaldulensis*, DS= *Dalbergia sissoo*, CD= *Cedrus deodara*, MA= *Melia azedarach*, SC= *Syzigium cumini,* AP= *Abies pindrow*, VN= *Vachellia nilotica,* PW= *Pinus wallichiana.*

3.3. Solutions adopted by respondents to combat wooden defects and diseases

The Figure 5 exhibits solutions adopted by respondents to settle down problems mentioned above. Among those who responded, largest percentage (27%) devised solution in form of replacement of defected wooden item (furniture/door/window), followed by (20%) who adopted repairing and polishing as treatments. The minimum percentage found “wasting” as more appropriate solution.

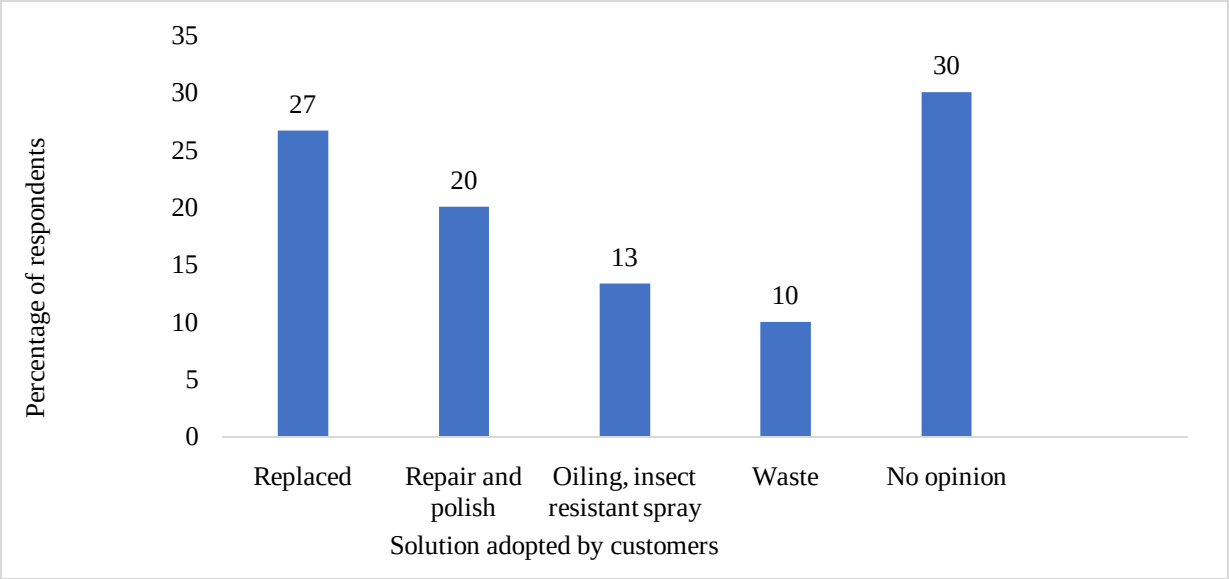

Figure 5: Solutions adopted by respondents to combat defects and diseases.

3.4. Practices of judgement of wooden furniture

Customers elucidated various means to estimate the quality of furniture as illustrated by Figure 6. Wood type, weight estimation (the higher the weight, higher would be the quality), structure, finishing, texture and material of the product and color (darker the color, higher would be the quality and vice versa) accompany respondent's comments that were indicated as integral parts for comprehension of quality. Somewhat different rather reasonable technique was also narrated i.e., 'knocking'; as perceived sound enables them to judge quality.

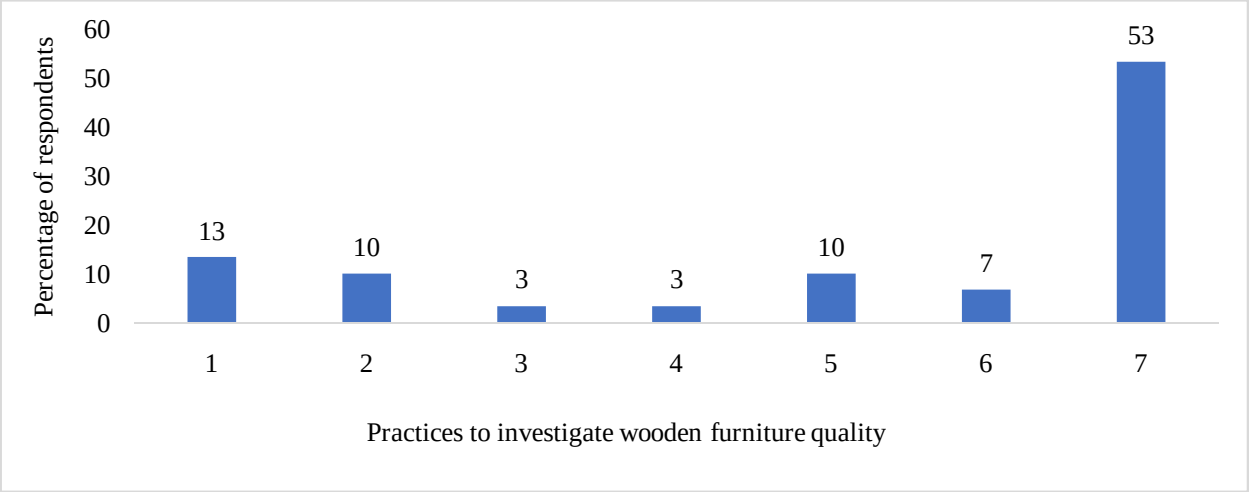

Figure 6: Practices to investigate wooden furniture quality. Where:

1= by observing type of wood, 2= by weight estimation 3= by color estimation, darker is good, 4= type of wood and color, 5=structure, material, texture and finishing, 6= by knocking, knots freeness, 7= No Opinion;

3.5 Safe Mode of wood and furniture transportation

The Figure 7 demonstrates respondents' perceptions regarding safest transport to carry wood/wooden furniture. Results reflected majority's (63%) point of view marking trucks/mini trucks while a small proportion of sample population (10%) acknowledged carts as safest transports for wooden furniture/doors/windows.

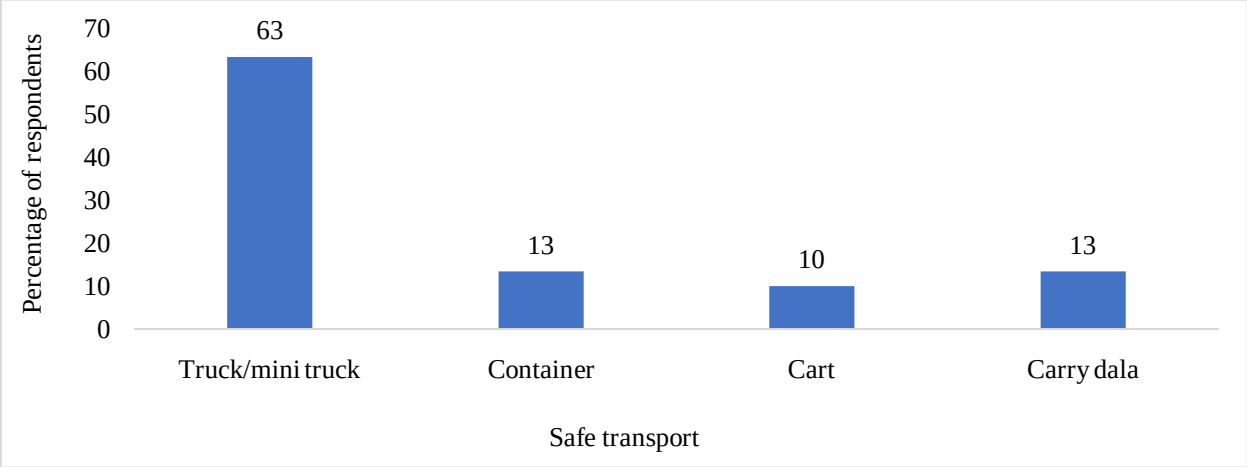

Figure 7: Safest transport to carry wooden furniture.

4. DISCUSSION

Quality identification of timber entertain various attributes as weight, durability, resistance to splitting, color, elasticity, grains, hardness and were designated as standards for quality assessment. Regarding customers, with respect to wood's preferences, majority of respondents of Multan area preferred *D. sissoo* and *C. deodara* for their furniture/windows/doors under various considerations such as strength, durability, reliability, appearance, insect resistance etc. Massive percentage upon investigating type of wood in their houses came up with *D. sissoo* and *C. deodara* and declared "quality consideration" as perspective behind choice of certain wood types. A reasonable percentage replied with no information regarding wood type in their

homes [13] relates in same line arguing that customers perception regarding wood identification was not sufficient.

Outcomes largely illustrated customers fall for *D. sissoo* as best regarding furniture manufacturing for all sorts i.e., simple and carved. It also inhabits durability and elegant appearance. Owing to this attribute, it is sold at high prices and dealers get good margins. Properly seasoned and dried D. *sissoo i*s insect/termite and decay resistant, and these wonderful qualities add feather to its cap. Among them, 80% produced simple while only 20% tended to manufacture carved furniture. Moore [14] stated that *Quercus incana* (Oak) was usually used to make furniture usually carved ones, in ancient times in different areas and countries. One of the finest hardwoods for furniture manufacturing is *Tectona grandis* owing to strength and looks but customers did not seem to be preferring it. It might be because it is not native to Pakistan [15], however, Brocco *et al*., [16] regarded it as highly fungal resistant. Customers showed least preference towards woods like *M. indica* etc. backing with specific grounds. McMahon *et al*., [17] referred in same scenario as *E. camaldulensis* and sapwood is susceptible to attack of lyctid borer and preservation is necessary. Though, its wood is hard and heavy, yet it needs care and attention when drying to prevent warping. Huilaja *et al.,* [18] inferred noxious and detrimental reactions pertaining to Western red cedar (*Thuja plicata*) in the form of Dermatitis along with allergic diseases like rhinitis, extrinsic allergic alveolitis and allergic asthma.

Consumers purchase furniture according to their taste, needs and status. They observe it by different scenarios and perspectives. Though there are several perspectives which effect customer's choice for wooden furniture. This division in percentage revealed majority's taste regarding their preferences.

First and foremost, factor was "design" as voted by 30% followed by quality (23%) i.e., quality was their secondary choice while design being first. Whereas (3%) mentioned "price" as prime factor. Considering same plot, demonstrated frequent factors that effect on purchase were

price, design, durability, material, quality, looks and color, environmental aspects [6] in similar plot inferred that color was a prime factor for American and Swedish consumers' selections.

McMahon *et al*., [19] framed in same line narrating customers considers 'designs' as an expression of their personality and they keep on changing it according to changing fashion styles to cope with trend. Customers usually prefer dark colored woods comparatively [20]. Imperfections stays at par of perfection, or nothing is perfect that makes it unique, perfection simply doesn't exist. Results related subsequent discussion exhibited same behavior regarding problems faced by customers in furniture.

Majority stated "breakage" issue regarding defect issues. Termite attack, twist, insect attack as the main issues suffered by respondents. Occurrence of shakes was also secondary issue in furniture.

Ponder [21] highlighted same scenario about a defect i.e., "Orange skin". Inadequate quantity or substandard quality of thinner, extravagant temperature difference between the lacquer and the surface, etc. could be core reasons. Uneven skin of lacquered surface of item is the sign that exposes "orange skin" defect thus giving unalluring view.

Ismail [22] illustrated in the same framework that defects could be caused anytime i.e., before, during or after processing. It is evident from results that respondent tried diverse solutions to fix occurred problems. Results turned out that majority of people replaced their defected furniture item rather than doing treatments. Followed by application of polish, oil and insect resistant spray to solve the issue.

Laffont and Berti [23] related similar circumstance as in Luiz de Queiroz Museum, termites attacked piano specially at the back and the bottom of it. Solutions included replacement of defected parts and application of preservative containing permethrin and other pyrethroids.

Yu [24] discussed same framework indicating functionality (comfortability etc.), durability (the material of the product) and appearance (color and design) along with reputation, credibility, brand name are the factors that provide confidence to the customer to purchase the product without any hesitation. Furniture should be purchased from dealers who provide warranty along, as this entity raises confidence and trust among customers and is good for dealer's reputation.

Transportation is also a very important issue in this perspective as it is the key entity that helps in working the whole function. It is very important to transport timber from harvesting area to the place where it would be converted into final form. Results depicted majority's interest for tucks/mini trucks as deduced by respondents' inferences. So, discussion relating transportation cost is crucial in this scenario.

5. CONCLUSION

Results depicted that consumer have good knowledge of wood quality and problems besides little is known to examine quality of furnished furniture. However, there is need to devise easy to use quality tests especially for examining wood hardness and moisture percent. Currently, no standards are in place for various woods, which may be developed after several studies of the kind across the country.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

6. REFERENCES

1.Cao, S., Suo, X., Xia, C., Yu, Z., & Feng, F. (2020). Net value of forest ecosystem services in China. *Eco. Engg.*, 01, 142: 10.1016/j.ecoleng.2019.105645

2. World leaders in wood product exports. Available on Worldatlas.com (Accessed on 13.10.2022)

3. Hart, J. F. (2010). A review of the effects of silviculture on wood quality. [G]. doi:http://dx.doi.org/10.14288/1.0103111

4. Lehringer, C., & Salzgeber, D. (2014). Repair of crack and delaminations in glued laminated timber. In *Proc. of the COST Workshop-Highly Performing Timber Structures: Reliability. Assessment, Monitoring and Strengthening, Biel, Switzerland* (pp. 43-48).

5. Riggio, M., Sandak, J., & Franke, S. (2015). Application of imaging techniques for detection of defects, damage and decay in timber structures on-site. *Construction and Building Materials*, *101*, 1241-1252.

6. Bigsby, H. R., Rai, C., & Ozanne, L. K. (2005). Determining consumer preference for furniture timber. *J. Forest Prod. Bus. Res*, *2*(2), 16.

7. Marchal R, Mothe F (1994) Appreciation of oak wood (*Quercus robur* L, Quercus petraea Liebl) for the French consumer and wood professionals. *Ann For Sci* 51:213–231.

8. Hoibo O, Nyrud AQ (2010) Consumer perception of wood surfaces: the relationship between stated preferences and visual homogeneity. *J Wood Sci* 56:276–283.

9. Ramananantoandro T, Ramanakoto MF, Rajemison AH, Eyma F (2013) Relationship between density and aesthetic attributes of wood and preference of Malagasy consumers. *Ann For Sci 70:649–658.*

10. Manzoor, Syed Amir, Aisha Malik, Muhammad Zubair, Geoffrey Griffiths, and Martin Lukac. 2019. "Linking Social Perception and Provision of Ecosystem Services in a Sprawling Urban Landscape: A Case Study of Multan, Pakistan" *Sustainability* 11, no. 3: 654. https://doi.org/10.3390/su11030654.

11. Hussain, S., Mubeen, M., Akram, W., Ahmad, A., Habib-ur-Rahman, M., Ghaffar, A., ... & Nasim, W. (2020). Study of land cover/land use changes using RS and GIS: a case study of Multan district, Pakistan. *Environmental Monitoring and Assessment*, *192*(1), 2.

12. Saeed, H. M. K., Qasim Shahzad, I. I., Nawaz, S., Bano, Q., Irfan, M., & Wahid, M. (2014). CHECK LIST OF ETHNO PHARMACOLOGICAL IMPORTANT PLANTS OF MULTAN PAKISTAN. *Int J Bioassays*, *3*(07), 3178-3182.

13. Bumgardner, M., Nicholls, D., & Donovan, G. (2007). Effects of species information and furniture price on consumer preferences for selected woods. *Wood and fiber science*, *39*(1), 71-81.

14. Moore, N. H. (2020). *The Old Furniture Book*. Frankfurt Am Main, Germany

15. Purnomo, H., Guizol, P., & Muhtaman, D. R. (2009). Governing the teak furniture business: A global value chain system dynamic modelling approach. *Environmental Modelling & Software*, *24*(12), 1391-1401.

16. Brocco, V. F., Paes, J. B., da Costa, L. G., Brazolin, S., & Arantes, M. D. C. (2017). Potential of teak heartwood extracts as a natural wood preservative. *Journal of Cleaner Production*, *142*, 2093-2099.

17. McMahon, L., George, B., & Hean, R. (2010). Eucalyptus camaldulensis. *NSW Government. Department of Primary Industries. Primefacts*, *1054*.

18. Huilaja, L., Kubin, M. E., & Riekki, R. (2016). Contact allergy to finished woods in furniture and furnishings: a small allergic contact dermatitis epidemic to western red cedar in sauna interior decoration. *Journal of the European Academy of Dermatology and Venereology*, *30*(1), 57-59.

19. Ponder, N. (2013). Consumer attitudes and buying behavior for home furniture. *Report prepared for the Furniture Outreach Program at Franklin Furniture Institute, Starkville, Mississippi, USA*.

20. Rice J, Kozak R, Meitner M, Cohen D (2006) Appearance wood products and psychological well-being. Wood Fiber Sci 38:644–659

21. Kruk, M., Świderski, B., Śmietańska, K., Kurek, J., Chmielewski, L. J., Górski, J., & Orłowski, A. (2017, June). Detection of 'orange skin'type surface defects in furniture elements with the use of textural features. In *IFIP International Conference on Computer Information Systems and Industrial Management* (pp. 402-411). Springer, Cham.

22. Ismail, M. K. (2010). Consumer shopping behavior for household furniture. *International Journal of Arts and Sciences*, *3*(7), 342-359.

23. Laffont, E. R., & Berti Filho, E. (2000). Detection, damage and control of the dry-wood termite in historical furniture of the Luiz de Queiroz Museum. *Scientia Agricola*, *57*(1), 173-175.

24. Yu, R. (2006). *The interrelationships between product quality and service quality: An exploratory study in furniture industry* (Doctoral dissertation). National University of Singapore, Singapore.