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Participatory Design of Portable and Adaptable Furniture Product for Village Traditional Pastry Vendors in Surabaya D Thamrin and G Mulyono Interior Design Department, Petra Christian University, Siwalankerto 121-131, Surabaya, Indonesia dianath@petra.ac.id Abstract. Traditional pastry making is an authentic skill and source of livelihood for many village vendors in Indonesia. Despite their potentials in improving regional economy and promoting traditional cuisine, village pastry vendors face marketing problems due to their poor product display system, lack of retail space, and uncertainty of available time to make and sell their pastries. This research develops the idea of designing a portable and adaptable furniture product that can help pastry makers to display and sell pastries efficiently and independently. Using the participatory method of design, the designers became participants of a pastry-making community in order to empathize with their problems and aspirations. Meanwhile, the pastry makers became participants in the following design processes of defining problems, ideating concepts and testing of furniture design prototypes. The result of this research is a furniture product for displaying and selling traditional pastries that is movable, adaptable to space and place, visually representable to the natural authentic image of Indonesian traditional cuisine, could be assembled and disassembled easily, and practical for storage and mobility. From the participatory design method, product designers also gain a reflexive awareness of their role in the society as agents of social innovation. 1. Introduction In culturally rich countries like Indonesia, local communities, with their authentic skills and local genius, have the potential in promoting a city's social and economic values [1]. Since 2010, the government of Surabaya city has issued a program called Kampung Unggulan Surabaya (Surabaya leading villages) as an effort to improve the regional economy by training and facilitating village communities as part of Indonesian small to medium enterprise (SME). Up to ten villages have been

selected in this program and were chosen based on their existing local skills. One of them is Kampung Unggulan Kue, a village where a community of traditional pastry makers routinely work together to sell and distribute pastries in small markets. Despite their potentials in improving the regional economy and promoting traditional cuisine to the modern society, these pastry makers face marketing problems due to their poor product display system, lack of retail space, and uncertainty of available time to sell them to the public. Majority of the community members are housewives who daily tend to their families and do not have the knowledge or skill in managing their business, especially in terms of visual merchandising. They mainly depend on external traditional markets or non-pastry food stalls to entrust the selling of their products. Such conventional display of traditional pastries observed do not have any unique visual merchandizing that could represent the authenticity and cultural values of these heritage delicacies. Sometimes, the women get offers to sell their products in village food courts; other times they sell their products via manual carriers or mass orders for special occasions. Yet, the role of these skilful women in improving social and economic power in the family has been proven to be truly significant [2]. On the basis of this background,

this research develops the idea of designing a portable and adaptable
furniture

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product that can assist these village vendors to improve the visual merchandizing of their pastries and help them sell their pastries independently and efficiently, regardless of the availability and uncertainty of time and space. Using the participatory method of approach in design, the designers became participants of the pastry community and engaged with their pastry making activities in order to empathize with their problems and needs. At the same time, the village vendors became participants in the following design processes of defining problems, ideating concepts and testing of furniture design prototypes. Through the design of furniture product yielded from this research, it is hoped that village vendors can enhance the practice of their authentic skills, promote them to the society and improve socio-economic conditions through the existing local genius of their community. 2. Research Method This research adopts the method of participatory design, a design approach that attempts to involve users and experts related to the project to assist designers in

the design process in order to ensure the usability of **the**

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product design [3]. This research was conducted in five stages of design process consisting of Empathize, Define, Ideate, Prototype and Test. In this research, not only the vendors became participants in the design process, but the designers also participate in the pastry making, packaging and selling activities as part of the Empathize stage,

in order to gain a deep understanding of their difficulties, aspirations **and**
goals **in**

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pastry making. From the Define-Ideate-Prototype to the Test stage, the vendors and members of the village community were invited and visited frequently to provide ideas and feedbacks. After the production of the furniture prototype, the designers also performed a usability test of the product by participating in a sales

trial using the furniture product to ensure that it would be truly usable. The failure to engage with potential users that could be part of a progressively impactful market force would cause a loss in a commercial design opportunity [4]. Hence, these participatory involvements form a crucial part of the design process in the development of the furniture product. 3. Results and Discussion 3.1. Empathize-Define

In the initial stage of the design, the

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designers visited the pastry making community and used ethnographic methods of data collection, a qualitative method of observation in which the researchers or designers would stay in a community for a certain amount of time and participate in the community's activities in order to grasp a deep understanding of their daily lives at their natural settings [5]. The design team in this research conducted informal discussions that emphasize more on dynamic interactions rather than structured interviews, analysed daily behaviours of the community and also participated in their pastry making activities. The activities included preparing raw materials, baking, cooking, packaging and eating them together (figure 1). Figure 1. Designers learn to empathize and participate in the activities of the pastry community Through being participants of the pastry community, the designers obtained valuable information on the community that could not have been grasped through conventional structured interviews. The designers gained a deep understanding of the community's aspirations in marketing the authentic Indonesian taste of their pastries, the natural ingredients used, the type of pastries being made, the product packaging techniques and difficulties in marketing and selling. Being mostly housewives, the pastry makers usually have to produce pastries as early as 2 am in the morning, entrust them to vendors in traditional markets or common food stalls while tending to their families in the morning. However they have free time late during the day till evening, a span of time they could use for selling their products independently. Unfortunately, they do not have the channel and space to sell their products directly to the public. Hence, together with the community, the design team discovered that an adaptable, practical and movable furniture product would truly be beneficial for them such that they could independently sell their products at any time and space available. Through open discussions and affinity diagrams, the designers defined the problems to be solved and factors to be considered in the product design in terms of form, function, performance, producer's interest, marketing and production (figure 2). Figure 2. Designers define problems to be solved and consider factors related to product design needed by the community The product defined in this research must have a modular form to ease its assembly when in use, and its storage when not in use. In terms of function and performance, it should accommodate the basic need of displaying at least ten different Indonesian pastries in a visible and attractive way such that it can encourage sales. Thus, it must support the visual merchandising of the pastry products. The furniture should also accommodate their use both indoors and outdoors and hence should be adaptable to the type of space available. It must easily be transported from one place to another. For assisting in branding and marketing, the furniture should also support the product image: natural, traditional and authentically Indonesian. Finally, in terms of production, the furniture ought to use materials that are readily available and are easy to be built in order to ensure the possibility of independent repairs or development in future. 3.2. Ideate-Prototype-Test After defining the factors of the product design, the researchers then began the process of ideation. Various design alternatives were produced that displayed modern systems of furniture product yet incorporating traditional Indonesian modes of display such as the use of bamboo display plates known as tampah, banana leaves, stems, along-alang (straw) roof, goni fabric and wooden materials (figure 3). Most of the design alternatives aimed at producing a variety of display methods with varying heights to accommodate the display of different types of Indonesian pastry. Some are placed on a surface and others could be hung. As a crucial part of the

participatory design method, the designers then involved the community members in the review and selection of design through presentation and dot voting (figure 4). The designers themselves provided feedbacks to each of their team members in order to further develop the design. From both participatory processes, many useful feedbacks were acquired. The pastry makers favoured the traditional display modes of using woven bamboo plates and display levelling system as they enhance the image of authentic Indonesian culture. They also favoured a display system that can adapt to exterior and interior spaces, and that could be kept easily when not in use. Figure 3. Designers develop modern furniture products for pastry display that incorporates traditional Indonesian modes of display (Mock-up by Claudia Filiana and Eko Prasetyo). Figure 4. Participatory method of design evaluation with pastry makers and design peers Based on the participatory method of obtaining feedbacks and developing concepts, the designers further established a concept of an adaptable portable furniture with an authentic traditional image abbreviated as "MANTAP," which stands for Movable, Adaptable, Natural, Traditional, Assembling, and Practical. The word mantap is also an Indonesian term for "awesome", especially spoken after the tasting of good food. The product design was redeveloped with 8 different modules that are detached from one another, each having a variety of functions (figure 5). Figure 5. Designers develop a multi-function furniture product for pastry display that incorporates traditional Indonesian modes of display (image by Diana Thamrin and Charles Hartanto) The first module is a large table-storage module, having dimensions of 1100 x 600 x 820 mm. This dimension was formulated based on the standard dimensions of a dining table that has a slightly lower height than food counters or stalls. This height enables a much broader view of displayed pastries. The table-like form of the module, made of pallet wood, also enables flexibility of use for both display and pastry packaging, as needed when products are being sold outdoors to street buyers. On the front of the table is a designed logo containing of an image of a woman with a typical traditional Javanese hair bund, placed on a woven bamboo plate to enhance the traditional and natural branding. The second module consisted of traditional bamboo plates of 500 mm, 300 mm and 200 mm in diameters, mounted on bamboo stems that could easily be detached. The third module is a rack made of bamboo stems. Pastries could be displayed by placing on top of each row or hanging them with threads tied on the stems as often used in the display of traditional nuts and crackers. The fourth module is a slanted rack with a combined dimensions of 400mm x 400 mm 250 mm, in which each wooden plain could be detached from one another in order to ease its assembling and disassembling. When not in use, the eighth and sixth modules, on which the rack is stacked on, can function as a packaging table. The fifth module is a simple wooden box with holes that support the vertical position of bamboo stems mounting the bamboo plates. The seventh module is a simple stair-like box that helps in dividing the display between different types of pastries. Finally, the sixth and eight modules are simple storage boxes needed by the pastry vendors to store excess pastries and other belongings when they are selling on the streets. Figure 6. Modular, assembling and stacking system of furniture product design for displaying traditional pastries, supporting the concept of a Movable, Adaptable, Traditional, Natural, Assembling and Practical concept of display product (image by Charles Hartanto) As a whole, the furniture product design display the features of "MANTAP" as introduced previously. The Movable concept was made possible by the modular design, in which every single module could be kept inside the first module and transported with the help of wheels installed beneath the table. Using modules that are stacked rather than combined in a fix construction supports the concept of Adaptability, as each module can be placed at different directions and positions according to the availability and characteristics of the space available. The modules themselves can also be placed separately on retail spaces and hence can adapt as both indoor and outdoor furniture. Furthermore, the various modules enable a larger variety of display compared to conventional display stalls and hence can increase the visual merchandizing of the pastry products. The concept of Natural and Traditional have been enhanced by the use of Indonesian customs in the method of display. Displaying pastries and other food on large woven bamboo plates, often

with banana leaves, is an authentically Indonesian way of displaying traditional cuisine in Javanese traditional markets [6]. The use of natural materials such as bamboo and pallet wood, with its distinct textural pattern, is a suitable visual representation of the natural ingredients in these pastries. Lastly, the concept of Practicality is evident as the assembling and disassembling of each module can be done at ease due to the temporary stacking system of construction. The design was produced with the help of both manual force and wood workshop machines such as handheld and stationary electric planer (figure 6). The use of teak pallet wood for majority of the furniture product is favourable compared to multiplex or solid wood as it is artistic, largely available, light-weight, durable, stackable, versatile, easy for construction or repair and is an environmental- friendly material [7]. The pallet sheets, having a thickness of 20 mm, were joined together using glue for parallel joints, and added with nails for perpendicular joints. The resulting form was then finished with a clear coat to expose and enhance the natural artistic wood texture. Modules made of bamboo were also joined using the mortise-tenon construction. The surfaces of the bamboo were also finished with a clear coat to maintain its natural texture. Bamboo plates are available in the market and the stacking system of construction enables them to be changed from time to time. The readily-available and simple materials used yielded a relatively economic product in terms of production. This would truly benefit the pastry vendors if they need to repair or develop the product in the future. Figure 6. Production of furniture product using naturally artistic yet economical materials such as teak pallet wood, bamboo stems and traditional woven plates. In order to ensure its usability to end users, the designers performed a summative usability test of the furniture product using the participatory method [8]. The designers themselves became participant users of the product by opening a bazaar in a public place and selling pre-ordered pastries made by the village community for a duration of three days. The pastry makers were also invited to assist in the sales. There were many positive results obtained from the test. First, the different types of display, with different height levels has made a dynamic display of different pastries, supporting visual merchandizing. This is evident through the high number of sales in three consecutive days such that the products were sold out by the afternoon during the three days of trial. Figure 7. Testing of final furniture product by both designers and pastry makers. The assembling and disassembling of the furniture product was also done with little effort. The whole process of disassembling took up a duration of less than ten minutes. All modules could fit into the table module as expected in the design. Transporting the furniture product and the pastry goods was easily accommodated by the lightweight modules, cubic storage boxes, a large bamboo handle on one side of the table for pulling and pushing, and wheels beneath the table. In terms of visual appearance, the natural and artistic look of teak pallet wood and bamboo, along with the authentic Indonesian mode of food display using bamboo woven plates also yield a mixture of modern and traditional look, enhancing the authentic branding image of the traditional pastry products, as hoped by the pastry makers. One limitation discovered through the summative testing process is that the background surfaces on which the pastries are placed is too similar in terms of tone and colour to that of the traditional pastries. A contrasting yet natural colour like green or yellow would make the pastries more visible and attractive. However, this could be easily addressed by using green banana leaves or traditional coloured cloth beneath the items displayed.

4. Conclusion

The result of this research is a novel form of furniture product for displaying and selling traditional pastries that is movable, adaptable to space and place, visually representable to the natural authentic image of Indonesian traditional pastries, could be assembled and disassembled easily, and practical for storage and mobility. As displayed by the results of this research, participatory design could be an essential key to both product and social innovation [9]. Through the participation of designers in the Empathize and the Test stage, as well as the participation of target users (the village community) in the whole design process, the furniture product design yielded can support the practice of local genius in traditional pastry-making and increase the social and economic values of a community. Product designers also gain a reflexive awareness of their important role in the society as

agents of social change. Acknowledgments The authors would like to thank Mrs Anik Pudjiati and the Kampung Kue Penjaringsari community for their collaboration in this research. Special mention also goes to the design team: Charles Hartanto, Claudia Filiana, Eko Prasetyo, Meinasari, Monica Santoso, Alexander Ferdinand, Alfonsus Reynaldo, Yulianto Kurniawan, Jonathan Andrianto, and Nico Maximillion for their participation in this research. References [1] Adi I R 2008 Intervensi Komunitas Pengembangan Masyarakat sebagai Upaya Pemberdayaan Masyarakat (Jakarta: PT Raja Grafindo Persada) [2] Setyati A W 2016 Peran Perempuan Anggota Kampung Unggulan Kue Penjaringsari dalam Meningkatkan Ekonomi Keluarga di Kecamatan Rungkut, Kota Surabaya AntroUnairdotNet Vol 5 (Surabaya: Airlangga University) p 461-70 [3] Sanders E B N 2002 From User-Centered to Participatory Design Approaches Design and the Social Sciences ed J Frascara (Taylor & Francis Books Limited) [4] Wilkinson C R and Angeli A D 2014 Applying user-centred and participatory design approaches to commercial product development Design Studies Vol 35 (Amsterdam: Elsevier) p 614-31 [5] Maginn P J 2007 Towards more effective community participation in urban regeneration: the potential of collaborative planning and applied ethnography Qualitative Research Vol 7 (California: Sage Publishing) p 25 - 43 [6] Nurhayati E, Mulyana, Ekowati V I and Meilawati 2014 Inventarisasi makanan tradisional Jawa unsur sesaji di pasar-pasar tradisional kabupaten Bantula Jurnal Penelitian Humaniora Vol 19 (Yogyakarta: Universitas Negeri Yogyakarta) p 124-140 [7] Blake P A 2012 A Process to Apply Hardwood Pallets as Viable Raw Material for Furniture Making Master's thesis (Georgia Institute of Technology) [8] Rubin J and Chisnell D 2008 Handbook of Usability Testing Second Edition (Indianapolis: Wiley Publishing Inc) [9] Freire K, Borba G and Diebold Luisa 2011 Participatory Design as an Approach to Social Innovation Design Philosophy Papers Vol 9 p 235-250