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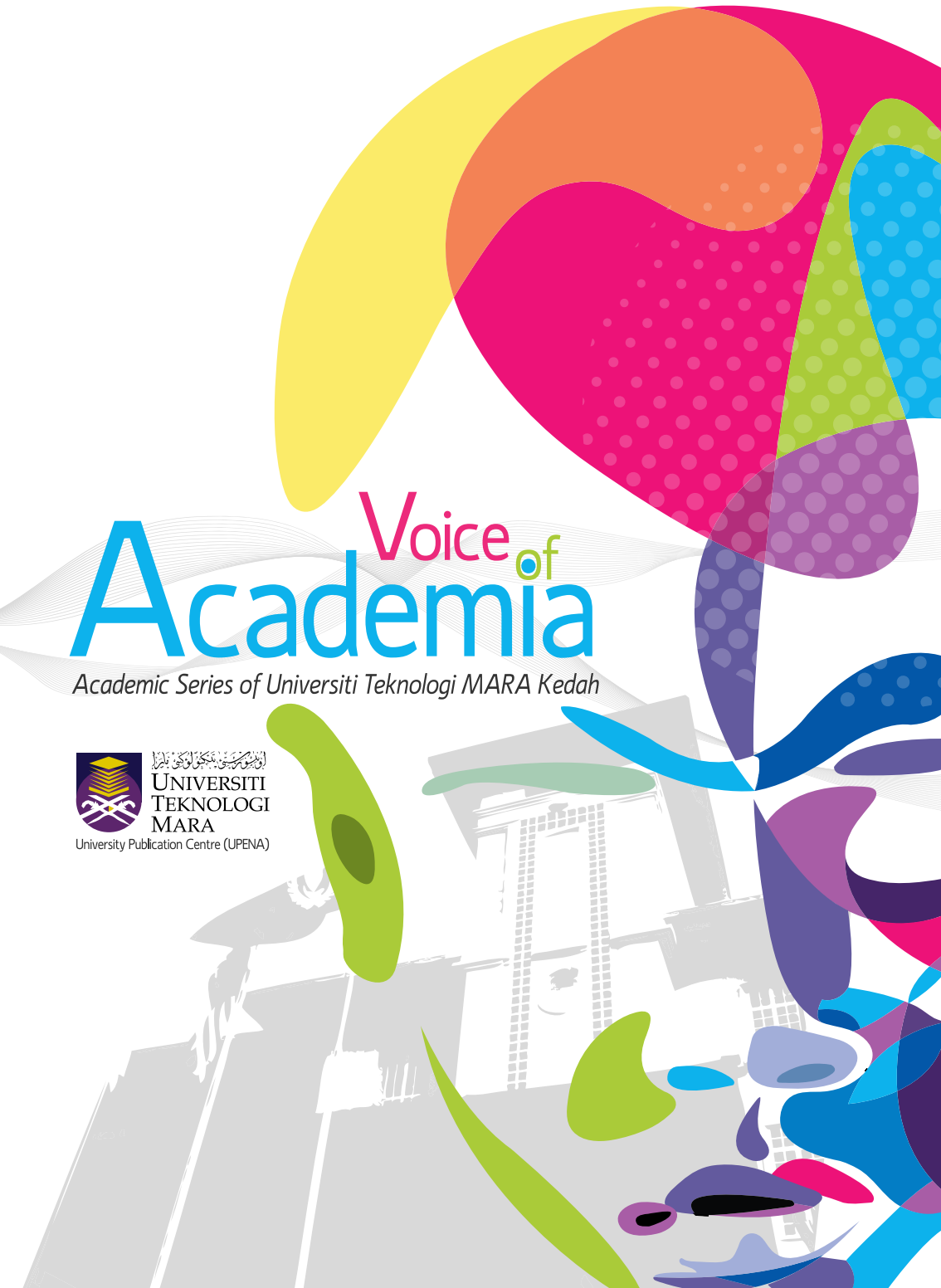

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Design through Research: Handpicking Tools Case Study as Facilitator to Collaborative Product Development

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ABSTRACT

Collaboration between research and design is believed by many design theorists to offer new originality, insight and specialist expertise for product design. In practice, however, there exists a discrepancy between this ideal and a reality of unreconcilable cultural and methodological differences. This project has proven that the collaboration between research and design fuels creativity. This study documents and discusses such a collaboration as an example of practice with implications for educators, designers and students. It identifies a new role with the appropriate knowledge and experience to act as bridges within companies, facilitating the adoption of design methodologies appropriate to changing priorities in the design industries.

Keywords: Design knowledge, Design Management, Design process, Creativity, Collaboration.

1. Introduction

The Golden Apple Snails or GAS is a species of freshwater mollusks and herbivore, this is the only species of snail so far known that is destructive to paddy seedling and young paddy plants. The attacks have made the world suffer a loss and this includes Malaysia. The estimated losses per year as a whole crop rice, the country's rice farmers was U.S $55-248 billion (Joshi, Cagauan, Wada, Yusa & Sebastian, 2003). In the Philippines, rice yield losses reach U.S $ 28-45 million per year (Naylor, 1996). With the increase use of pesticide (Joshi et al., 2003) as one of controlling methods of the GAS attacks, it will cause water pollution including loss of biodiversity in water waterways.

It seems that GAS has impact on rice cultivation and due to this, cost of production increased as farmers resorted to chemical control. The GAS also has potential to damage the paddy seedlings. Research program and control measures were formulated by the Department of Agriculture in Malaysia by introducing methods such as environment-friendly control measures (cultural and biological controls), handpicking, wire mesh screens or filters and also using duck.

The handpicking method (Penny, 2006) was widely used by farmers because they were easy to apply compared to other methods. However, this method is not effective to eradicate the GAS as it only destroys the snails. Hence, the researcher will adopt the handpicking method by developing a tool that could pick the eggs of the GAS instead of GAS itself. The researcher developed this method as it was found that the eggs have value which can be sold to Muda Agricultural Development Authority (MADA).

2. Research Objectives

This study focuses on achieving three objectives:

1. To understand the latent and salient needs of the paddy farmers in eradicating the Golden Apple Snails using handpicking.
2. To propose a solution to the identified problem.
3. To evaluate the proposed solution.

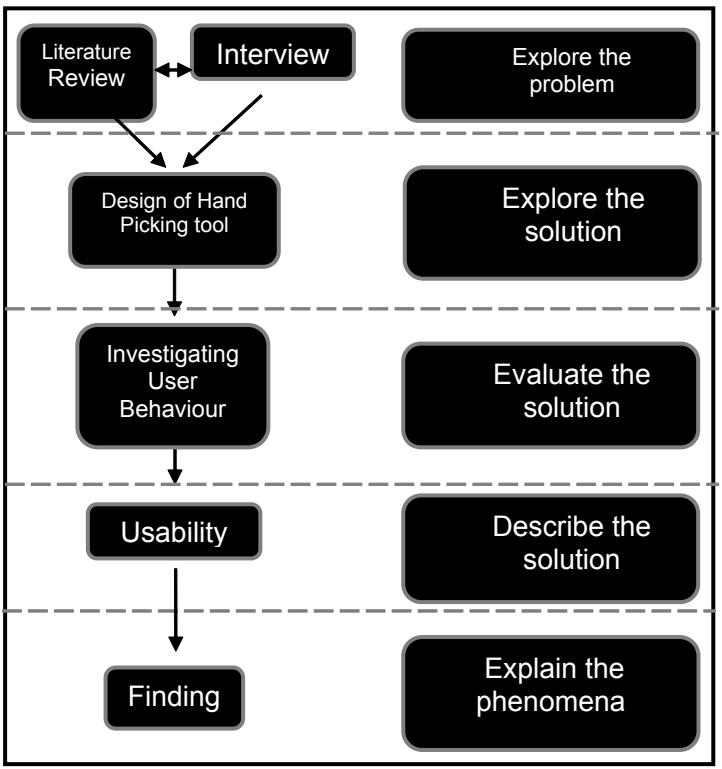
3. Methods

A case study was found to be suitable as to answer the research questions. The research questions are:

A. What is the best prevention method taken in controlling the GAS?
B. Why do the farmers prefer to exercise the current prevention method?
C. What are latent and salient needs of the farmers if the current prevention method is further developed?
D. How can the design solution proposed help to ease the problem (if any) that is currently faced by the farmers?

A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence" (Noor, 2008, p. 1602). The evidence used in a case study is typically qualitative in nature and focuses on developing an in-depth rather than broad, generalizable understanding. Case studies can be used to explore, describe, or explain phenomena by an exhaustive study within its natural setting (Yin, 1984).

Table 1. Flowchart of research process in this study.



4. Project and Design Development

The investigating user behaviour was used to establish conceptual design for hand picking tool. An efficient method for capturing and communicating the best idea indeed is important at this stage. The researcher has adapted

the standard conceptual elements by Fogg (2003) to develop the idea. The researcher began by:

4.1 The Design Challenge

The researcher started the project by explicitly stating the goal and time investment of this project. The conclusion drawn from the interviews directed the researcher to design a hand picking tool that attempts to help the farmers eradicate the GAS. The design should be simple, easy to operate and cheap.

4.2 The User Description

The paddy farmers prefer to practice the hand picking method (Figure 1) to eradicate the GAS instead of using other methods such as chemical and biological control.

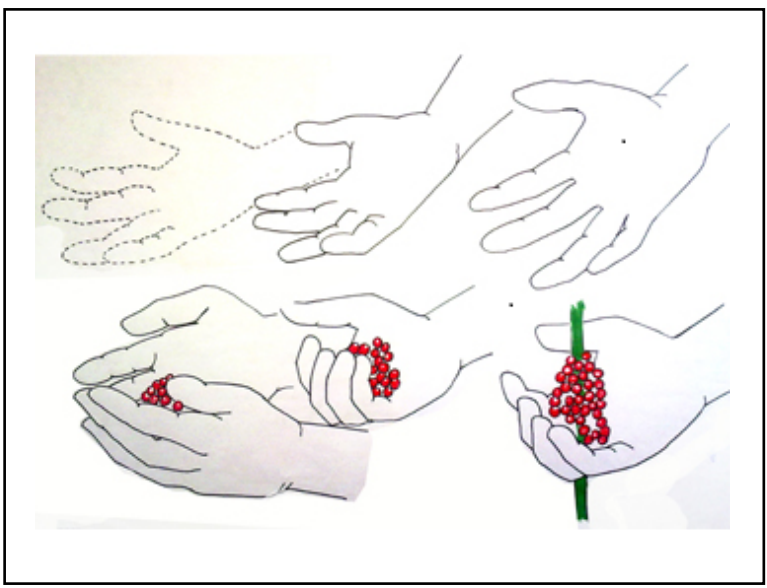


Figure 1: The ideation drawing using the hand picking method

4.3 Features/functionality

There are three designs were developed from the initial ideation. The first development was Design A (Figure 2). This design follows the user's requirement where plastic food to be used as the container for the egg clusters. The plastic can be inserted and tied to the four holes located at the side of holder. During the scooping process of the egg clusters, the egg clusters will be grasped by the mouth of the scoop and user will scoop up the egg clusters so it will drop into the plastic food packaging container through the hollow hand picking holder. Design B (Figure 3), adapting the tweezers concept, the user's will grip the egg clusters and pull upward. The egg clusters will drop in between the tweezers container. The egg clusters then will be thrown into other container or plastic bag. Design C (Figure 4) is also adapting the GAS picking tool uses scissors mechanism to grip the egg clusters to pull up and with the two baskets situated at the left and right will gather the egg clusters that have fallen. The tapered end basket design will allow the egg clusters to be collected easily and the round shape with rubber flap located in the middle of the basket will direct the egg clusters to drop in the left and right basket smoothly without falling to the paddy tile.

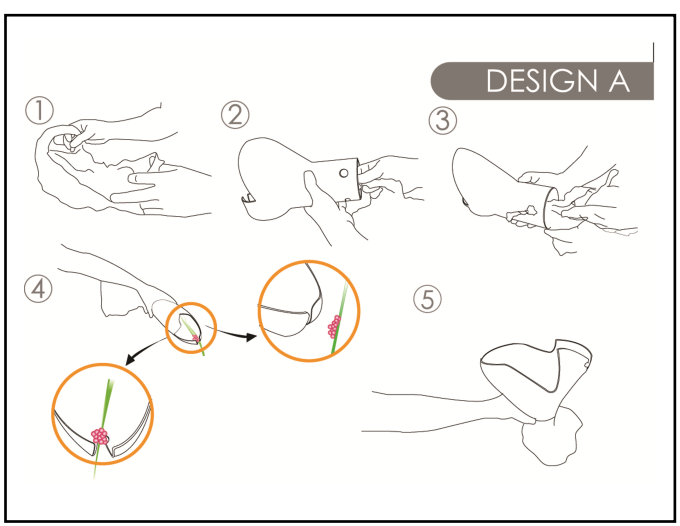


Figure 2: The ideation of Design A drawing using the hand picking method

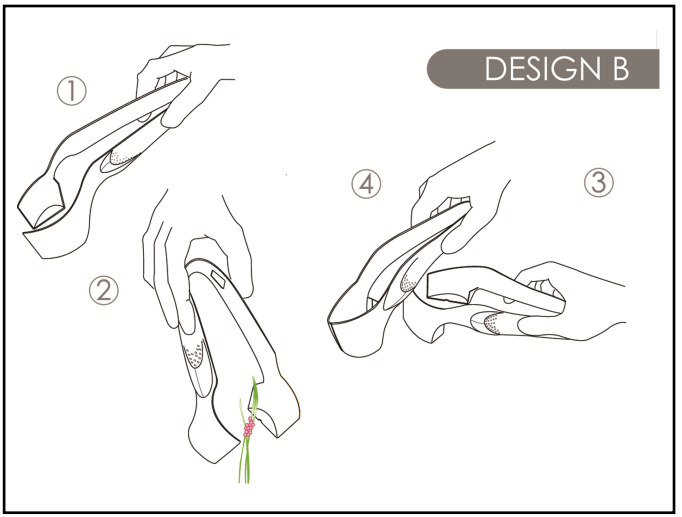


Figure 3: The ideation of Design B drawing using the hand picking method with tweezers concept

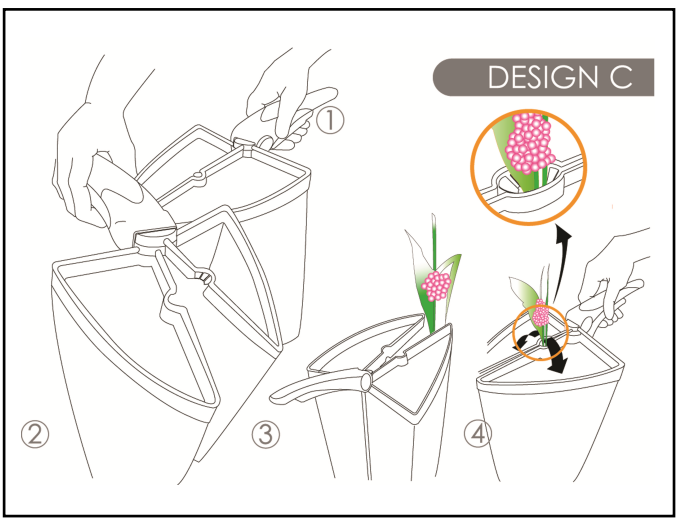


Figure 4: The ideation of Design C drawing using the hand picking method with scissors mechanism

5. Findings

From the overall data analysis, it can be concluded that the findings point out the positive feedback as the product designed by the researcher fulfils the requirements and needs of users but the researcher also points out the problem of the design. It was found that the product has weaknesses especially during the scooping process of the egg clusters. The researcher felt that this weakness occurred due to counter intuitive made by the researcher to the 3 designs. Due to time constraint, the researcher only tested Design A as it was evaluated to fulfil the requirements and needs of users. The researcher tends to overlook at the core problem which was the hand picking process.

It also can be concluded that any researcher who undertakes a research must carefully look at the research design. Qualitative was found to be suitable in understanding users; however the involvement of participants in this research is rather difficult. In this study, the researcher only manages to get 8 farmers to participate and the findings gained cannot be generalised to all farmers and the reliability of the findings will often be questioned.

6. Conclusions & Recommendations

In this section, researcher will explain the implications involved during finding process.

First, investigating user behaviour is one method used in design research to explore the behaviour patterns and to predict the performance limits, of potential users of a new design. The investigating user behaviour provides directional design input (Don & Petrick, 2003). This approach is not trying to get the user to tell you how or what to design; instead trying to elicit their goals and needs by focusing on how they perform their current tasks independent of the specific product being developed. Investigating user behaviour proves that the researcher was able to tease out the cognitive model of the respondents, which is invaluable in setting design direction. Conducting the investigating user behaviour in the context in which the product will be used can add richness of detail which might otherwise be missed and this approach also can be conducted with more people in less time and additionally, they help generate more authentic discussions.

Second is practical implication of design method on designing process, Jones (1970) described that designing comprises of three essential stages of analysis, synthesis and evaluation. It can be described as breaking the problem into pieces, putting the pieces together in a new way and testing to discover the consequences of putting new arrangement into practice. The three stages are named divergence, transformation and convergence. Divergence is the act of extending the boundary of a design situation so as to have a large enough, and fruitful enough, search space in which to seek a solution. In this study the researcher found that the amount of information search need not to be too speculative at this stage and fail to see the point of fact-finding before any critical decisions are taken and before discovering what is it the researcher is looking for.

Transformation is the stage of pattern making, fun, high-level creativity, flashes of insight, changes of set, inspired guesswork; everything that makes designing delightful. Transformation stage is when judgments of values, as well as of technicalities, are combined in decisions that should reflect the political, economic and operational realities of the design situation. Out of all this comes the general character or pattern, of what is being designed, a pattern that is perceived as appropriate but cannot proved to be right. It was found that design methods is vital in designing process, as it helps to manage information gained and structure the information accordingly. This current study involves designers to conduct research through creative practice work and hence intends to address both a design brief and larger set of questions at the same time. The researcher agrees that without the knowledge of managing and strategizing research carefully it will lead to broad array of complexity.

Third is the implication of usability testing on design research attempts to evaluate the proposed solution and the results of usability testing demonstrate that it does give invaluable design insights. The usability testing enables the researcher to see if the user's cognitive model matches the model of the product. The researcher found that it helps in informing future design research by generating new information. The researcher found that during the usability testing, many new questions were being posed, ideas were being interrogated and assumptions were being tested regarding the hand picking tool concept. Therefore, the researcher agrees with Burdick (2003) that critical reflection is a necessary component of a design research practice and designers must be able to articulate their

questions and conclusions.

This study also has several limitations that should be looked into. First, this study is limited to only 8 farmers of Muda area, especially at District IV and any attempt to generalize this study to any other areas must be proceeded with caution. Second, this study uses design that is developed with no references of existing product of hand excavator and is solely based on information gained through observation. Third, the usability testing were done only to test the design concept using model and the findings gained cannot be taken as reliable as this study is only to explore the design possibilities to establish theoretical justifications.

In the past, design is understood by a limited availability of people with the skills to get their ideas on paper or into production. Technical skills were required and most colleges concentrated on training skill students. With the utilization of computers, it has revolutionized the design industry. Now, design is a commodity in creative industry and the researcher found throughout this study is that there is difference between design per say and design that serves as research. If you are doing a design it means you will involve in exploration of creative process but if you are doing design to serves as research, then it has to do with the goals and outcomes of each.

As mentioned earlier, designers who are conducting research through their creative practice work that is intended to address both a particular design brief and a larger set of questions at the same time. This process is so complex and critical reflection is a necessary component of a design research practice. The value of such formal investigations is not only to advance the array of choices designers have to call upon when in the act of designing, but also to advance the knowledge of the disciplines that make up design by developing a critical understanding of the work we do and the objective we create. It is recommended that research culture should be nurtured as design research fuel creativity and the practice based method should be further promoted and enhanced.

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