# Expert Validation of Touch Point Method in Ideation Process based on User Benefit and Creativity

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**B.Thamilarasan [1], Nor Fasiha Mohd Yusof [2] and Mohd Noor Harun[3]**
[1]School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor.
(E-mail: thamilarasan2@graduate.utm.my)

[2]Engineering Design Research Group, School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor.
(E-mail: fasiha@utm.my)

[3]Sports Innovation & Technology Centre, Institute of Human Centered Engineering, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor.
(E-mail: mnoorharun@utm.my)

**Abstract.**"You've got to start with the user experience and work backward to the technology"– Steve Jobs. This study demonstrates the importance of understanding the user before undergoing the engineering design process. Recently, many researchers in the design engineering fieldwork focussed on the early phase of the design process due to decision making. There are many tools developed to gather and understand user needs. Touch Point method is an example of a user-oriented design approach that focuses on gathering user needs. In this study, Touch Point method is taken as the experimental method to compare with a controlled method of the design process. Participants are the 4th year Mechanical Engineering students of UTM, JB, whom separated into two groups. They are trained with different approaches – Touch Point method and traditional design process – and are required to solve a same problem. Outcomes are in the form of detailed sketching of design concept. Every design concepts produced by both groups are evaluated by seven design experts. They evaluate the design concept via user benefit, originality and feasibility criteria. Significant effect also identified for originality, with negative correlation. Results are discussed. In conclusion, this study proves the importance of understanding user needs during early stage of the design process.

## 1. Introduction

There are various types of design approaches used in design engineering field for the past forty years. All the design approaches share the same purpose but differ in terminologies [1].There are two types of design approaches - traditional design approach and Design Thinking. The traditional design

approach uses a technical method such as functional analysisin gathering user needs. Nigel Cross used this type of design approach for the past forty years [2]. On the other hand, Design Thinking is developed by Tim Brown to focus on understanding user needs using empathy [3]**.** This approach is preferred by many recent researchers to overcome the tangibility problem between the user and the design engineer.

This tangibility is also known as touch points in design. It is a process between the design practitioner and the user [4]. The problem arises when the users felt dissatisfied with a product. The issues can be about the functionality of the product or also known as user's preference. In this study, the user preference is known as user needs. The user needs is a series of specifications of the product that need to be developed according to the user's wish. However, all the products now are developed according to the user's needs but the issue still seems to be found while undergoing design process. In other words, even though the user's wish is carefully identified, the specifications that listed still do not reflect the real needs of the user. But yet, understanding the user is a subjective process, especially when the information that the design practitioner need to gather from the user cannot be seen through naked eyes. To solve this issue, i.e. to dig down to the real user needs, empathy is an important factor to be considered.

Empathy is a psychological approach of putting yourself into another person's situation. It is used in various fields of research, such as clinical, education, taxonomy and engineering [5]. The development of empathy in design engineering could improve the satisfaction of the user on the product. The user is the main factor in the product development process. About 61% of the decision making is done in the early phase of the design process, based on customer needs [6]. Besides, the ill-defined problem cannot be solved by a design practitioner due to the lack of understanding of the users' problem. Many organizations such as IDEO, Apple and Dyson prioritize the user needs or experience to develop a new product. Every design firms have their own approach or tool to gather user needs. For instance, persona [7], customer journey mapping [8], MINDS method [9],Design for Motivation, DeMo [10], and Touch Point method [6].

This study is conducted to study the effect of an empathic approach in conceptual design of a design process. As empathy is very subjective component, an appropriate method or tool needs to be used to analyze the significance of the empathic approach via creativity and user benefit analysis. This study suggests using Touch Point method due to its versatility of the method. This method is used in many workshops to make the beginner understand the empathic design and to understand the user's needs while undergoing the first phase of design process [11].

### *1.1 Touch Point Method*

Touch Point method is as shown in **Figure 1**. As this study involves a studio-based learning process, this method is suitable and easy to be taught for the final year engineering students. This method falls to align with the current design process, where the final step of this process involves the conceptual design process. The engineering students that undergo this design process have an average experience in solving the design problem. Since they are not been exposed fully in the real working situation. This method helps them to learn a healthy way of developing a product according to the user's needs. Moreover, it is also important to highlight the second step of this method. Customer Journey mapping analysis is used in this method to understand the user's problem and extract the user's needs from the user's journey.


**Figure 1.** Touch Point method

*1.2 Aims and Hypotheses*

The goals of the present study were to test whether the empathic approach in the design process helps in obtaining the user needs and results in promoting a healthy way of understanding the user problem before engaging in the ideation process.

Specifically, our expectations were the following: (1) User needs can be obtained successfully with empathic approach (Touch Point Method) by using the appropriate empathic tool before ideation process, and (2) the empathic group's design outcome has more significant in terms of user benefit compared to creativity. Both these hypotheses were tested against the null hypothesis that no change in creativity and users' benefit by implementing the respective empathic tool.

## *2. Methodology*

*2.1 Research Design*

A quantitative descriptive research design was used to conduct this study as shown in **Figure 2**. The purpose of this study is to discover the significance of user benefit and creativity when Touch Point method is used. This study is conducted for the 4th year Mechanical Engineering students, UTM, JB. The 4th year students are very suitable for this study because they have completed almost all the fundamentals subjects of Mechanical Engineering. They can learn and practice engineering design theories for this study by using their available knowledge. The students are separated into two groups - the Touch Point method and controlled method group, respectively. Both groups have a particular design lecturer to monitor the student's activity. As the study's data collection is mainly on the design concept, the design lecturer helps to guide the students until the end of the conceptual design.

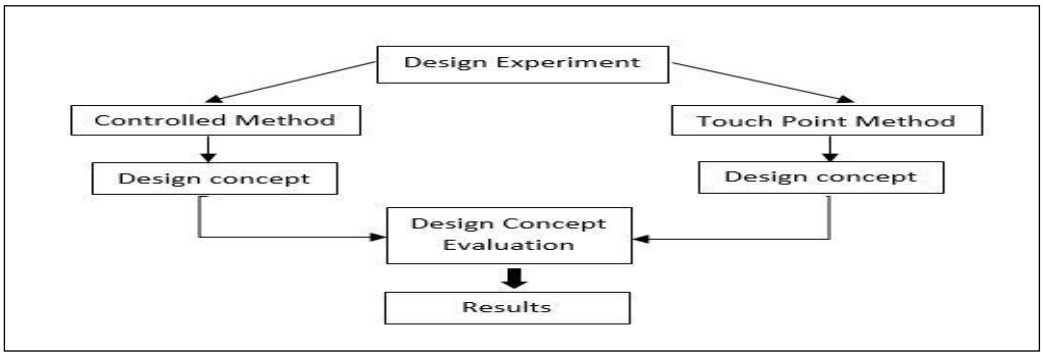



**Figure 2.** Design experiment flow.

*2.1.1. Controlled and experimental methods*

The controlled method is the method that has been taught in the institution for the Mechanical Engineering students of UTM. The method used is the traditional method in the design process by Nigel Cross. Nigel Cross method uses technical approach to understand the user's needs. **Figure 3** shows the Nigel Cross design model [12].

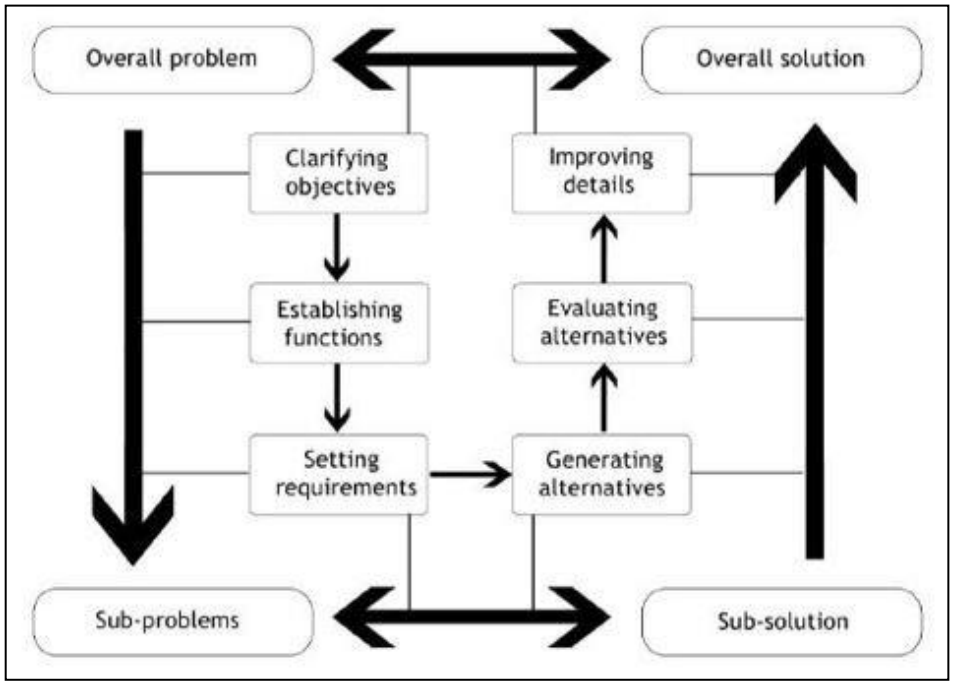



**Figure 3.** Cross Model as a controlled method

The experimental method used in this study is Touch Point method. This is an empathic approach design method. The method has three steps to follow, which are team building, customer journey map and ideation method as shown in **Figure 1.** [13]

*2.2 Data Collection*

This study took two groups of students for its data collection. The process of obtaining data is by undergoing studio-based learning under the supervision of System Design lecturers. The process took about 7 weeks of lecture on both methods in both sections of the class. Each class has about 30 students, who have an average understanding of the design process. This data collection is limited to the first phase of design process. The design task given for the students is about “Agriculture”. They had to solve the problem faced by the farmer in the corn and yam farm. After teaching the Touch Point method and Cross method on the respective category of classes. The design outcome is obtained as a result of this data collection. Both controlled and experimental methods produce design outcomes in the form detailed sketching respectively.

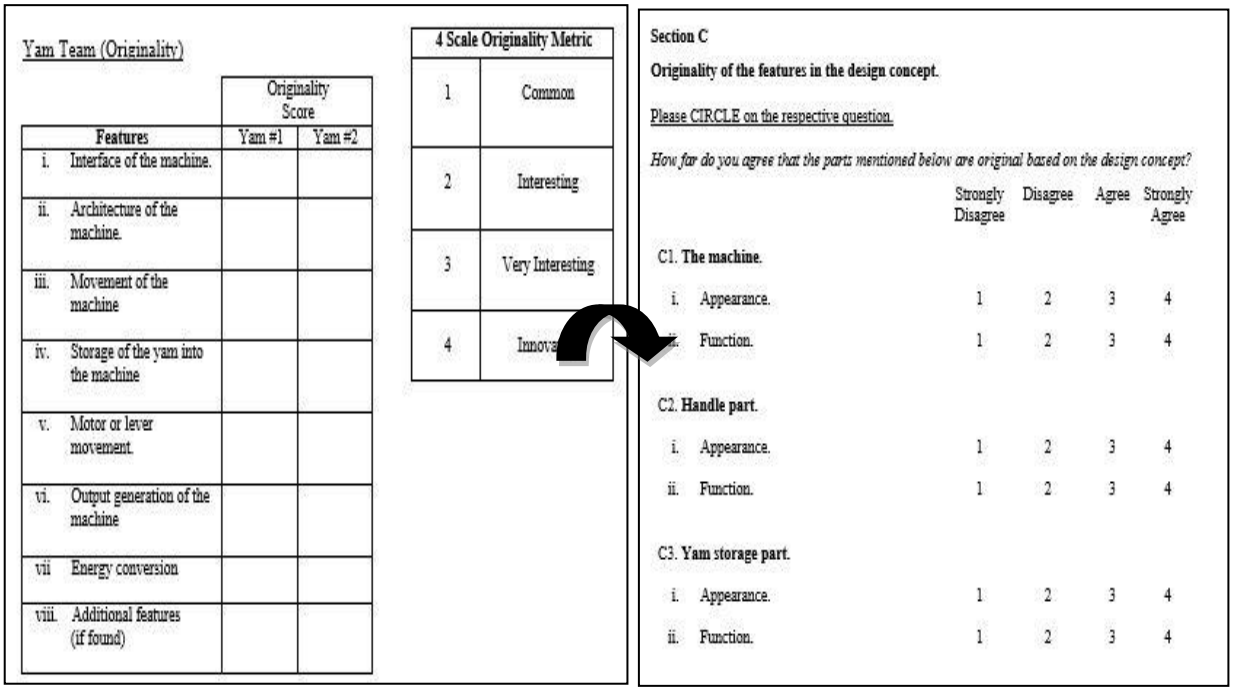
This design outcome is presented by the students to the lecturer. As they can produce a quality and presentable design outcome. The purpose of doing this process is to ensure the design outcome can be evaluated by the design experts for this study.

*2.2.1 Experts Evaluation Process*

After obtaining the design outcome from both controlled and experimental methods. There are two categories of design outcomes by both methods, which are Yam and Corn category. Seven design experts, who have more than 10 years experiences in design field were chosen to evaluate the design outcome. They are given a guideline on evaluating the design outcome with the parameters related to this study.

*2.2.2 Development of Evaluation Material*

The design experts are given an evaluation form to evaluate the design outcome for both groups. The development of the evaluation material has three steps, which are choosing the available evaluation metrics, revising the evaluation form with the professionals and finalizing an evaluation form with obtained corrections and suggestions from the professionals The evaluation form development is done by revising the amendment obtained from the professional parties. This is to ensure the evaluation material to not be biased while the design outcomes are being evaluated. Finally, there are two parts in this evaluation form 1) Design Outcome and 2) Evaluation Form. The development of the evaluation form is shown in **Figure 4.**



Yam Team (Originality)

| Features | Originality Score Yam #1 | Yam #2 |
|---|---|---|
| i. Interface of the machine. | | |
| ii. Architecture of the machine. | | |
| iii. Movement of the machine | | |
| iv. Storage of the yam into the machine | | |
| v. Motor or lever movement. | | |
| vi. Output generation of the machine | | |
| vii Energy conversion | | |
| viii. Additional features (if found) | | |

| 4 Scale Originality Metric | |
|---|---|
| 1 | Common |
| 2 | Interesting |
| 3 | Very Interesting |
| 4 | Innova |

**Section C**

**Originality of the features in the design concept.**

Please CIRCLE on the respective question.

*How far do you agree that the parts mentioned below are original based on the design concept?*

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| C1. **The machine.** | | | | |
| i. Appearance. | 1 | 2 | 3 | 4 |
| ii. Function. | 1 | 2 | 3 | 4 |
| C2. **Handle part.** | | | | |
| i. Appearance. | 1 | 2 | 3 | 4 |
| ii. Function. | 1 | 2 | 3 | 4 |
| C3. **Yam storage part.** | | | | |
| i. Appearance. | 1 | 2 | 3 | 4 |
| ii. Function. | 1 | 2 | 3 | 4 |

**Figure 4.** Development of evaluation form to questionnaire form.

*2.2.3 Evaluated Parameters*

Originality metric– The originality metric has 4 scales. The originality of the design concept is observed on the genuine idea of the design concept's features. The originality metric is measured or described in terms of "1" = Common, "2" = Interesting, "3" = Very interesting and "4" = Innovative as shown in **Figure 5A.**

Technical Feasibility metric–The technical feasibility uses 4 point scale of the feasibility metric. The evaluator will follow this scale to evaluate the design concept. The design concept by observing and understanding the features in the design concept. The metric is described as "1" = feature very difficult to manufacture and cannot function, "2" = technically difficult but still feasible, "3" = Quite easy and feasible and "4" = Very easy and feasible as shown in **Figure 5B** [14].

User Benefit metric– The user benefit is based on the innovation categories of the design concept. As the design concept reflects the user satisfaction. Most of the innovation gets the users' interest and Saunders evaluated more than 200 inventions to create innovation categories. The innovation categories are described in **Figure 5C**.The components involved to evaluate the user are functionality, architecture, external interactions, user interactions, and cost. In this study, the cost is not relevant as this study scope is up to design concept level [15].

A

| 4 Scale Originality Metric | |
|---|---|
| 1 | Common |
| 2 | Interesting |
| 3 | Very Interesting |
| 4 | Innovative |

B

| 4 Scale Feasibility Metric | |
|---|---|
| 1 | Very difficult, not functional at all. |
| 2 | Technically difficult, but still feasible |
| 3 | Quite easy and feasible |
| 4 | Very easy and feasible |

C

| User Benefit Metric | |
|---|---|
| 1 | Strongly Disagree |
| 2 | Disagree |
| 3 | Agree |
| 4 | Strongly Agree |

**Figure 5.** Evaluation parameters to evaluate the design outcomes

*2.2.3 Statistical analysis tool*

This study needs at least 7 evaluators. The data from the evaluators are processed using the SPSS software. It is a software used to perform statistical analysis based on the data collected. This study used Mann-Whitney U-test because the number of samples is very small and it is good to use the Mann-Whitney U-test. This data falls under independent t-test and it is used to check if there is any significance in the data between both groups. The p-value is very important to be understood in this study. Mann Whitney U-test will produce the sum ranks of both groups. The sum of ranks determines which method is the best method, but the data must be statistically significant with **P-value < 0.05.** The result studied in two ways, whereby overall and category level of the data in terms of originality, feasibility and user benefit.

## 3. Results & Discussions

The scores from the seven experts are analyzed using the Mann-Whitney U Test. This test is suitable due to the discontinuous distributions of the mean score. This study compares the user benefit, originality, and feasibility between Touch Point method and controlled method groups.

### *3.1 User Benefit Score*

**Figure 6** illustrates the mean rank of both groups ($M_{control}$ = 10.61, $M_{TP}$ = 18.39, p-value = 0.011). Since the p-value is less than 0.05, the result obtained is statistically significant. Thus, the mean rank of the Touch Point method is higher than the controlled method. This result is positively significant to the objective of this study, as the empathic approach is beneficial in understanding the user needs. Besides, the result proves that Touch Point method is a suitable method to extract user needs compared to the controlled method, which uses the traditional method. A further understanding of these results is the strength of the Customer Journey step. It helped the design practitioner to brainstorm an idea without overlooking on the user's needs. As the experts believe the Touch Point will benefit the design practitioner to understand the problem faced by the user throughout the first phase of the design process.

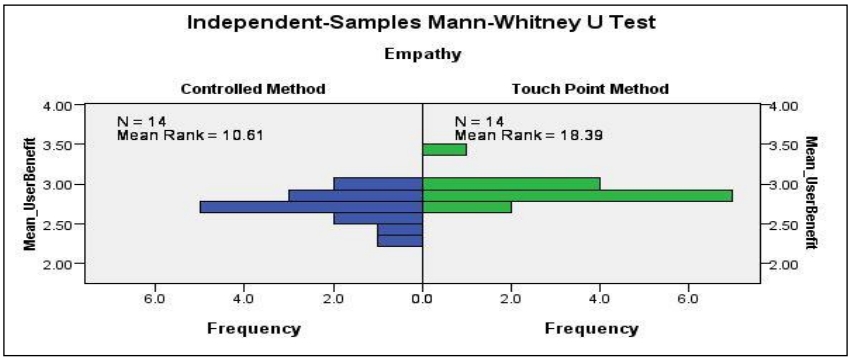



**Figure 6.** Effect of Touch Point method on user benefit (p-value 0.011)

### *3.2 Originality Score*

Figure 7 illustrates the mean rank score for both groups ($M_{control}$ = 17.61, $M_{TP}$ = 11.39, p-value = 0.044). The mean rank for the controlled method significantly high compared to Touch Point method. This result is not favorable to this study. The originality is a very important factor in evaluating the creativity. It is known to be a genuine outcome of a particular idea. Thus, the controlled method achieved high mean rank due to the structure of the Cross method. Cross design model ensures the documentation and analysis to be in a technical way. It is very normal for this method to achieve high score in originality. The method involves available market study, this includes the patent study as well. Whereas, the Touch Point method focuses on solving the user's problem. As the empathic approach is a user-oriented design approach, the solution developed must first satisfy the user. In other words, the solution must close to being practical, and thus, less original and less creative. This issue can be discussed as the pullback factor of the empathic approach.

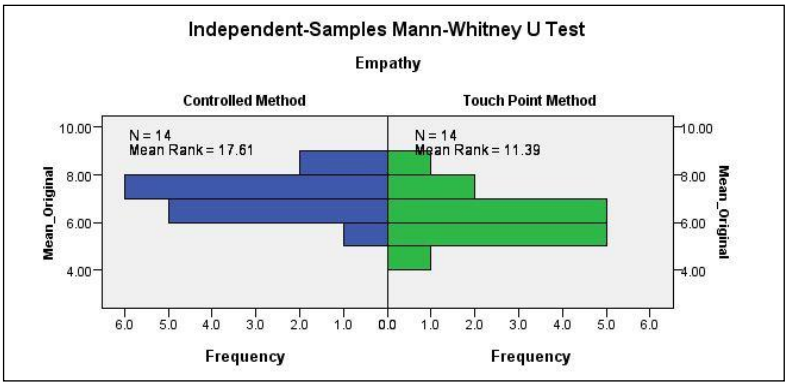



**Figure 7**. Effect of Touch Point method on originality (p-value 0.044)

*3.3 Feasibility Score*

Figure 6 shows the mean rank score of feasibility by both group ($M_{control}$ = 13.21, $M_{TP}$ = 15.79, p-value = 0.427). The effect of Touch Point method on feasibility is not statistically significant. Thus, there is no evidence to support the significance between both groups. The technical feasibility is an important parameter in evaluating creativity, however, it is difficult to evaluate feasibility by just looking at a design concept. A bigger scale of study involving the process up to the development of working prototype is required.

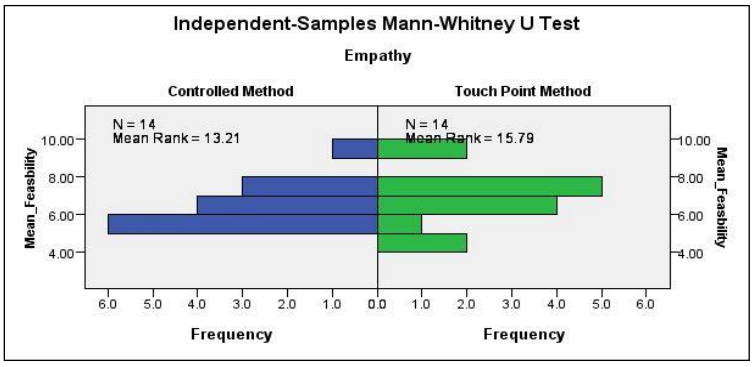



**Figure 8**. Effect of Touch Point method on feasibility (p-value 0.427)

## 4. Conclusion

The Touch Point method is a very unique method that proves the design ideation through understanding the user needs will benefit the user. This will definitely affect user satisfaction on the product. Understanding user needs is not about feeling the user only. But, it is also about transforming the needs into design knowledge. The Touch Point method holds a major function in gathering user needs. With the aid of Customer Journey Mapping, the method found to be successful in empathizing the user. This method can be implemented in the design education and it helps the beginners to work on the ability to understand empathy and user needs.

The controlled method uses the traditional design process method. It involves technical procedures for undergoing the design process. In fact, the user study is based on research such as product review

and patent study. A method to feel the user is always missing in the traditional design process. Therefore, the controlled method is good in generating an original idea.

The connection between the user and the designer is an important issue to be unfolded before undergoing the design process. This study suggests a revision on the traditional design method by implementing the Touch Point method into the early phase of the design process. By implementing the Touch Point method, a design practitioner or a design firm can achieve in producing new ideas and satisfy the users markedly. Significantly, the stakeholder can achieve profit by marketing a new idea and gain user interest.

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