

Ian Douglas  
Zhengjie Liu *Editors*

# Global Usability

 Springer

# Human-Computer Interaction Series

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Human-Computer Interaction is a multidisciplinary field focused on human aspects of the development of computer technology. As computer-based technology becomes increasingly pervasive – not just in developed countries, but worldwide – the need to take a human-centered approach in the design and development of this technology becomes ever more important. For roughly 30 years now, researchers and practitioners in computational and behavioral sciences have worked to identify theory and practice that influences the direction of these technologies, and this diverse work makes up the field of human–computer interaction. Broadly speaking it includes the study of what technology might be able to do for people and how people might interact with the technology. In this series we present work which advances the science and technology of developing systems which are both effective and satisfying for people in a wide variety of contexts. The human–computer interaction series will focus on theoretical perspectives (such as formal approaches drawn from a variety of behavioral sciences), practical approaches (such as the techniques for effectively integrating user needs in system development), and social issues (such as the determinants of utility, usability and acceptability).

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Ian Douglas • Zhengjie Liu  
Editors

# Global Usability

 Springer

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ISSN 1571-5035

ISBN 978-0-85729-303-9

e-ISBN 978-0-85729-304-6

DOI 10.1007/978-0-85729-304-6

Springer London Dordrecht Heidelberg New York

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Control Number: 2011922524

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Springer is part of Springer Science+Business Media ([www.springer.com](http://www.springer.com))

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# Chapter 20

## Usability in Thailand

Teeravarunyou, Sakol

### 20.1 Overview of the country

Thailand is located in the central part of South-East Asia – it covers an area of 513,120 square kilometres and is bordered on to the north by Burma and Laos, on the east by Laos and Cambodia, on the south by the Gulf of Thailand and Malaysia, and on the west by the Andaman Sea. The Thai population was 67,070,000 in 2009. The culture of Thailand is very much influenced by India, China and the rest of Southeast Asia. There has been large-scale immigration from China, and to a lesser extent, from India. The culture of Thailand is primarily influenced by Buddhist morals, value, and customs. Thailand is nearly 95% Theravada Buddhist, with minorities of Muslim (4.5%), Christian (0.7%), Mahayana Buddhist, and other religions. Thai culture is greatly influenced by traditional Buddhist beliefs regarding ancestral and natural spirits, which have been incorporated into Buddhist cosmology (National Statistical Office of Thailand, 2009).

Most of Thailand's labor force works in agriculture. However, the relative contribution of agriculture to GDP has declined while export of goods and service has increased. The main industries are automobiles and automotive parts (11%), financial service (9%), electric appliances and components (8%), tourism (6%) and others. In Thailand, many industries are mainly original equipment manufacturer (OEM), where products are produced by Thai company under foreign brand name. Even though Thailand exports a lot of high and low technology products such as automobiles, electronic appliances and consumer product, the industries still have a very low number of products that are designed in Thailand. After a rapid increase in the gross value of industrial output in China in 1986, the Thai government has foreseen the problem of OEMs shifting from Thailand to other countries with cheaper labor. As a result, the Thai government has recognized the importance of the creative industries, which combines the country's cultural assets with technology and innovation to create products with distinctive features. The Thai government encourages industry to have their own original designs and brands especially in small and medium enterprises (SMEs). There are government agencies that support the SMEs such as Department of Export Promotion, National Innovation Agency, and Thailand Creative & Design Center. These organizations have their roles to assist SMEs to design their own products. Thus, this has the implication for the needs of usability expertise to design an innovative product.

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I.Douglas and Z. Liu (eds.), Global Usability, Human-Computer Interaction Series,

DOI 10.1007/978-0-85729-304-6\_20, © Springer-Verlag London Limited 2011

## **20.2 Overview of usability in Thailand:**

Usability in Thailand is covered by several communities including computer science, computer engineering, information technology and product design. Usability in Thailand can be classified by two main areas:

### ***20.2.1 Usability for Human-Computer Interaction***

Human-Computer Interaction (HCI) education in Thailand is covered under digital media, computer engineering, information technology and robotic schools. They teach different aspects of HCI based on their backgrounds. These kinds of fields produce the computing-technological products. Most schools teach students how to create an interaction by using the computer technology and media. For Thai industries, HCI is most widely used in the area of web application and interactive exhibition. Software designers use the design guidelines to develop their own applications. For the exhibition design, designers create an experience of interaction between displays and audiences that is mostly found in expositions and museums. The example can be seen from the Museums of Siam (National Discovery Museum Institute, 2010) where the interaction techniques including hologram movies and interactive paint brushes are used to tell the story of Siamese anthropology.

### ***20.2.2 Usability for Human-Centered Design***

The second type of usability links to the Human-Centered Design (HCD) principle. The non-computing technological products like consumer product and furniture require usability principles to make the product easy to use and universally applicable for all types of consumer. For the product design, many design schools in Thailand have used ‘The Design of Everyday Things’ Norman (2002) as their reference book. Moreover, usability is similar to the principle of HCD, since the product should be designed based on users’ point of view. HCD integrates users as a part of design process, using methods such as user observation, participatory design and usability testing. The aims of HCD are to create the products that respond to the needs of users and are easy to use. For the interior and packaging design, the concept of Universal Design (UD) includes the principle of usability. This term is defined by the Center for Universal Design at North Carolina State University as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.”

(The Center for Universal Design, 2008). The UD principle is similar in conception to the Heuristic Evaluation (Nielsen & Mack, 1994). However, the difference is that the Heuristic Evaluation focuses on an interface design of computer software, whereas the UD emphasizes specifically the tangible interface and ergonomics. There are some of the seven principles of UD that are the same as heuristic evaluation guidelines such as maintaining flexibility in use, making important information perceptible, and providing tolerance for error.

### **20.3 Usability Education in Thailand:**

There are currently no schools specialized in HCI in Thailand and no specialist programs. Many of the courses that are available are electives in departments of computer engineering, information technology, or robotics. There is only a school specialized in HCD. The school of architecture and design at KMUTT started a graduate program in 2005. The usability education can include the following fields of study.

#### ***20.3.1 Human-Computer Interaction Education***

The first part of the HCI curriculum focuses on the artistic and aesthetic senses of computer media. There are around 10 universities such as Silapakorn University, Sripatum University, Asian University, Rangsit University and others. Many of them have a school of Digital Media, Interaction Design or Multimedia. The aim is to produce students to serve industry in the fields of advertising, animation, game, and website development. Such universities offer this type of curriculum because of the fast growth of animation industry in Thailand and the promotion of software Industry Promotion Agency which hosts an annual event called Thailand Animation and Multimedia (TAM). The second group of the HCI curriculum focusing on science and technology consists of around 20 universities that offer information technology, robotics and computer engineering classes. Some of them integrate HCI into the program of study. For example, the Faculty of Management Science at Prince of Songkla University, the Institute of Field robotics and Computer engineering at King Mongkut's University of Technology (KMUTT) have HCI as an elective class. Those schools produce software tools for usability testing, for example, the data logger of cursor movement on web pages.

#### ***20.3.2 Human-Centered Design Education***

The third group of the HCD curriculum concentrates on the aspect of tangible interface. There are around 10 schools that teach the product design including Chulalongkorn University, King Mongkut's Institute of Technology Ladkrabang (KMITL), KMUTT, Rangsit University and

others. The School of Architecture and Design at KMUTT is the first offering a usability testing class in its masters program for 3 credit hours. An undergraduate level, students are also taught to do the user observation and participatory design.

## **20.4 Academic Research and R&D of Usability**

### **20.4.1 Academic Research of Usability in the Thai context**

#### **20.4.1.1 Journals**

There are no journals specifically related to the usability in Thailand. As a result, many Thai researchers have published their papers in international journals instead. Some of the research topics are related to the cognitive and cultural aspects of design. For example, the cultural differences on attention and perceived usability: color combination of animated graphics is a study that compares American and Thai cultural groups (Noiwan et al, 2006). The findings lead to the conclusion that users across cultures tend to ignore animated banner graphics when they look for specific information on highly informative Web pages. Another type of the usability topic is specific to the Thai context, for example, “the Software prototype of Civil Court Case Management in Thailand” (Rungrunangpattana and Achalakul, 2009), which was evaluated by using usability methods. The objective in this research is to improve the court process by decreasing the time delay and expense in case management. The results showed that a new design was effective and would benefit several groups of people ranging from the court personnel to the general public.

#### **20.4.1.2 Conferences**

Thai authors participate in the oversea conferences relating to usability. Many authors are from different fields such as education, computer engineering, architecture and information technology. “A Comparative Analysis on Web Heuristic Usability between Thai Academic Web Sites and US Academic Web Sites” (Noiwan et al, 2000) is a study using a checklist model by Keevil and Associates. Some problems in using these checklists have been found. It was evident that US web sites have higher usability indexes than the Thai web sites. The web design styles between Thai and US web sites are different in terms of aesthetic issues and information provided.

Another example is “Factors influencing the Adoption of Thai eGovernment Websites (Wangpiatwong et. al, 2005). The main purpose of this study is to explore which factors influence the adoption of eGovernment websites regarding information quality and system quality aspects. The study confirms that information quality such as accuracy, relevancy, and completeness was more significant than timeliness and precision. Efficiency was the most significant factor.

An interest in Universal Design is seen in the topic of “Accessible Market: A Prototype for People with Disabilities in Thailand” (Kutintara et al., 2009). The authors studied how disable people might access a Thai fresh market. The result indicated that people with disabilities could not access the market because of lack of suitable parking zone, lack of ramps, walkways with obstacles, the lack of zoned area for the food court and of standards of food stalls. Another paper titled “A Case Study of Usability Testing of Software Tools for People with Learning Disabilities” (Poobrasert, 2009) from the Rehabilitative Engineering and Assistive Technology, Institute of National Electronics and Computer Technology Center illustrates activity in this area. Seven software applications from NECTEC were evaluated by using heuristic evaluation.

Thai researchers come from different backgrounds and their approaches for usability are varied and different. Some of research used a comparison of cognitive performance between eastern and western cultures, while some focus on specific issues of case studies such as Thai organization, or Thai software. On the other hand, some of them have done the research based on their particular interests such as assistive technology and disabled people that may be applied in a more global context.

## ***20.4.2 Research and Development for Small and Medium enterprises(SMEs)***

Many products from SMEs are new and have never been used by mass-consumers before. In Thailand, there are 2.83 million entrepreneurs (according to the Office of Small and Medium Enterprise Promotion, 2008) producing the product ideas that require substantial usability testing before launching them in the market. Two case studies demonstrate how usability expertise supports the SMEs, namely IP Phone and Air Pak. The IP phone uses the principle of HCI while the Air Pak focuses on HCD.

### **20.4.2.1 Case study of IP Phone usability**

The Telecommunications Research and Industrial Development Institute (TRIDI) focuses on technology development and R&D. One of the products that they strongly support is IP phone,

which allows telephone calls to be functioned over IP network. The Forth cooperation public company is a local manufacturer that develops and produces the office phones. TRIDI, a funding agency that would like to assist the company in terms of exploring new market and product hired consultants from Redek (R&D company under KMUTT). Forth would like to integrate the IP Phone technology in the housing of an existing office phone, given the cost of plastic injection molding is expensive. The company targets IP Phone users for tourists and office workers since there are a large amount of tourist attractions and international businesses. In Thailand, IP phone is not been popular for Thai users. One of the reasons is that users seem intimidated by the complexity of computer embedded products. As a result, usability is crucial for this type of product.



**Fig. 1.** Focus group, Usability testing, Software and hardware prototyping of IP phone

Instead of positioning the product at low price, the company would like to increase the added value of the product in a specific Thai context and niche market. The ultimate goal of this

project is to develop a telephone housing, touch screen interface, navigation panel, and graphic user interface (GUI). The problem of existing interface is that the information structure is not designed for a casual user. The new design of the software interface uses icons and was designed based on the same style and layout of mobile phones. Two groups of eight Thai tourists and eight office workers participated as the focus group and in usability testing (see Fig. 1). The focus group was used to verify the consumption demands and understanding of users' interpretation of the icons. For the usability testing, subjects were introduced to the IP phone and assigned to use the software prototype from the computer screen.

The results from the Focus group suggest that the IP phone for Thai office workers and tourists had some specific needs and issues. For example, subjects preferred to have a daily calculation of their expense on hotel services during their stay. The reason is that they needed to control their budget especially when they stay at luxury hotels. Thai office workers requested conference calls to communicate with other business companies outside the country. They would like to record the meeting conversation to have a clear understanding of the foreign language and write the minute of meeting.

The results from the usability testing suggested that the interface theme of IP phone should be similar to the mobile phone in order to reduce the problem of learning. Only some items should be changed, for example, the redundancy of the contact number and speed dial functions. For the hardware interface, subjects from both groups preferred to use a larger touch-screen interface. The navigation buttons on the left side of screen interface was not seen as necessary. In general, they did not have difficulty when they used the product. They could finish all tasks in a short time, since the depth of screen structure was no more than three levels.

The result of the study was presented to the TRIDI committee and promoted in a seminar with Thai SMEs. Many of the audience were inspired and started to have new ideas on their own products. TRIDI realized the importance of the usability for which they had never given the funding before. The Forth company also used the result of the usability to develop and strengthen their products.

#### ***20.4.2.2 Case study of Usability Testing on Respiratory protective device***

The usability testing of a respiratory protective device (RPD) is another example of a product from a SMEs inventor. It was inspired from the real case of a fire that occurred in the Royal Jomtien Hotel at Pattaya, Thailand on July 11, 1997. The fire killed 91 hotel guests and staff and seriously injured 51. As a result, that SMEs inventor designed a product called Air Pak (Alias name). Air Pak, a type of RPD, supports evacuation of people from smoke-filled or fire-affected environment by providing a limited oxygen supply. It consists of a heat resistant plastic

hood (up to 165°C) and aluminum canisters containing compressed breathable air (12 bar, 1 minute duration) with a heat resistance silicone air tube (up to 220°C) as a delivery method (see Fig 2c). Air Pak is a self-contained open-circuit compressed air escape breathing apparatus with a hood. Foreign standards that are applicable to Air Pak are BS EN 1146(2001) and AS/NZ 1716:2003(2003). Since the product is still questioned in terms of safety and ease of use, the inventor of Air Pak wanted to know how usability testing could be used to evaluate the product.

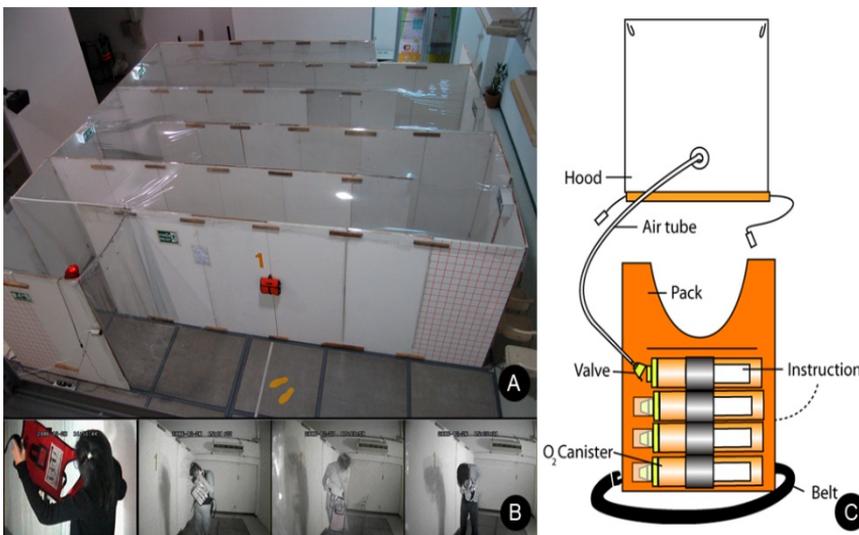


Fig. 2. Testing room and Air Pak for usability testing

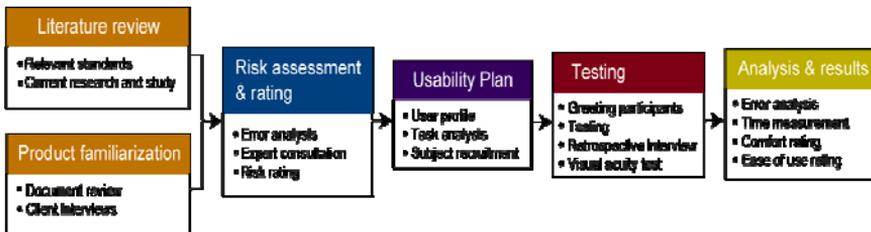


Fig. 3. Process of Air Pak testing

The usability testing process of Air Pak took around 3 months from the literature review of industrial standards as shown in Fig. 3. Before starting the test, the researchers did the pre-test analysis by interviewing the firefighters and collecting the data from the inventor who designed the Air Pak. It was discovered that Thai standards as well as studies regarding RPD were limited. Thai specifications of RPD for use in Thailand were not available; therefore, the literature review relied purely on international standards and research findings alone. Although there are numerous standards in the market, many of them relate to product performance such as material and physical properties. There is still a lack of human performance tests in existing industrial standards for such safety equipment. In product familiarization, researchers must understand the product usage and functions more clearly. The user profiles of the Air Pak are company workers and tourists.

For this testing, the performance measurement method was used to verify the usability issues. A walkthrough of the product by researchers and an interview with the inventor had identified the tasks involved in the use of Air Pak starting from searching for information, reading instructions wearing the tool jacket, and removing it. Since the product cannot be tested without a suitable environment, the simulation of the environment needed to be built. The testing room was designed with partitions and covered with the plastic sheet on top as seen in figure 2a. Inside the room, there was only emergency signage that could give the direction of the walkway in the dark. To make the situation more real, the alarm was turned on while participants used the product. Many infrared cameras were installed at the corner of walkway to capture the behavior of users while they walked through the rooms. For the next stage, 30 subjects were assigned to use the product. 15 males and 15 females with an average age of 32, Ten subjects were randomly assigned to crawl, another 10 walk and the rest run through the smoke. After the testing, an interview with subjects was conducted to find out problems that could not be captured from the surveillance camera. Subjects also rated the score of comfort and ease of use for this product using a Likert scale.

The data from video were analyzed and summarized as statistical data. The measurement of effectiveness is the success or failure to achieve the goal. The most unsuccessful task was the pressing of valve lock. Only 1 from 30 subjects was able to hold the lock valve to release the oxygen. It meant that 29 subjects did not use the oxygen while they escaped. For the efficiency measurement, subjects spent more time putting on the equipment than they took to escape. However, they did figure out how to plug in the air tube into the canister. Most errors made by subjects were in putting on the hood, releasing the valve lock, and reading the instructions respectively. Many subjects read the instructions back and forth while wearing the equipment. Although the instructions were quite clear, they still did a lot of errors. The reason might be a difficulty in operation; for example, the valve was difficult to press. If the product has too many steps to operate, subjects tend to make mistakes under the time pressure.

The Air Pak testing illustrates the cognitive function of subjects when operating the product. The dislocation of instruction, fear of plastic hood, misuse of valve lock are examples of user's problem solving and mental model, in actual rather than ideal circumstances. After the researchers submitted the usability report to the owner of this product, they agreed to improve their products without any hesitation.

## **20.5 Extent of activities: universities with educational programs, industrial activity, and conferences meetings/organizations.**

### ***20.5.1 Facilities***

Unlike in developed countries, usability labs are rare in Thailand. Several labs are similar to usability testing labs, but with different purposes. For example, the Nation newspaper has a one-way mirror room to observe how audience read the advertisement on the newspaper, which is similar to the Faculty of Medicine, Ramathibodi Hospital, the psychiatrist uses one-way mirror to observe autistic child's behavior. The usability lab at KMUTT is specifically used for design evaluation. It has two testing rooms. One is for the small products that fit to the area of 13 x19 ft. The room is flexible and can be arranged into different activities' areas such as computer room, children's playroom and meeting room. The examples of products tested here are computer games, radios, websites, and toys. Another room is for a large-scale product with an environment area of 22x36 ft. This room has high ceiling and access floor with the cable under it. The examples of the product testing are office layouts, simulation of fire escape, furniture designs, car driving simulation and others. Both rooms can be simultaneously observed with one control room. There are surveillance cameras, one-way mirrors, audio amplifier and sound capture installed in the room. The software used for the analysis is Noldus® Observer. Other usability tools include an eye tracking device for the study of perception and human attention. The school operates this lab for academic purpose and industrial service. Students can use this lab to test their designed products and to analyze them with the software. It is also used by industry or foreign usability companies to test products.

### ***20.5.2 Conferences and Seminars in Thailand***

Ergonomics Society of Thailand (Charoenporn, 2005) introduced the usability issue into the conference programs in Southeast Asia. The Eighth Pan-Pacific Conference on Occupational

Ergonomics (PPCOE 2007) discussed the topic 'Design for Accessibility and Usability'. There were many participants from Hong Kong, Korea and Thailand. Many research papers focused on usability, such as the interpretation of traffic signs (Chan and Ng, 2007), navigation of mobile phone interface (Park et al, 2007), a tool for supporting usability design (Chaivoraporn et al. 2007). In terms of the research, many of the papers are connected to the interface design and new products.

TCDC hosted a seminar for on 'the Benefit of Universal Design packaging' on February 27, 2008. The workshop invited speakers from Japanese companies and the Japan Packaging Institute. The key objective of the seminar is to promote how usability affects the design of packaging especially for the group of elderly and disabled people. Assoc. Prof. Orrasa Jirapinyo from King Mongkut's Institute of Technology Ladkrabang also gave a lecture on user-friendliness of universal design in packaging.

Another conference related to usability was the 9<sup>th</sup> Southeast Asian Ergonomics Society Conference (SEAES 2008). Several papers were from Philippines and Indonesia. Many of them referred to the usability of the consumer products and context such as the emotional reaction to products (Seva et al. 2008), cultural difference (Seva et al. 2008) and product safety (Teeravarnyou 2008).

World Usability Day 2009 include a seminar event hosted by UsableLabs (Piyawat, 2008) from Prince of Songkla University on November 2. A two-hour seminar introduced Thai audiences to usability practices. The seminar focused on the design of social webs, design for every day thing, and usability in the real world. Most of audiences were students from Faculty of Engineering, Sciences and Management sciences. UsableLabs had received funding from a variety of organizations including the Thai Health Promotion Foundation, the Thailand Research Fund and the King Prajadhipok's Institute. UsableLabs also promotes usability and knowledge management through the website named GotoKnow.org.

The increasing number of conferences and seminars demonstrates that usability issue is gaining in popularity in Thailand, but there are still not a large number of studies in this area. There is a need for a specialist conference to promote usability to practitioners. On the academic side, usability is popular in HCI and HCD. However, usability is still relatively unknown in many Thai industries. To promote usability, education should increase the number of usability courses and research projects.

#### ***20.5.4 Sample of industrial projects and R&D carried out in the country.***

For HCI, there are some educational industries that promote the electronic products. For example, Inex is a company that produces and sells the electronic equipment for education. High-school students all over the country are encouraged to build robots, since Thailand hosts many robot competitions. When the demand of robotic market in Thailand began, Inex started to promote HCI through its 'Prototype Electronic Magazine' in June 2009, (Inex, 2009). This magazine demonstrates how to do an interactive product.

Exhibition design for events is another rapidly increasing market. Pico Thailand is a company that services events and exhibition with the implement of interactive systems. Two examples of this are at the museum of Siam and the children museum (Pico Thai, 2008). XtremePlus is another company that mainly focuses on the interactive technology (XtremePlus, 2008). The examples of products that they created are an interactive fog screens and touch screens.

Many foreign companies desire to evaluate their products for Thai market and this includes usability testing. Although many Thai industries do not use the usability services, there is a lot of demand from foreign consultant companies. They would like to ensure that their products are appropriate to Thai culture, context and use behavior. One example is the Nokia phone. Nokia desired to know the local context that affects the usability of its products, such as text messaging in Thai alphabets. They hired a Thai consultant to collect the usability information for them. They also requested other methods from social science and marketing, such as in-depth interviews and diary probes. This in effect was a combination of user study, usability and market research.

Usability testing is a relatively new issue for the Thai software industry. Many developers rely on product training rather than improving the usability of their products. They do not integrate usability testing into their process due to whether lack of awareness or additional cost implication. The use of specialist design consultants at the early stage of the design process is something that is currently a rare occurrence. However, progress towards this should be is something that needs to be encouraged.

## **20.6 Conclusion**

In conclusion, usability is increasingly important for the Thai SMEs market, and several companies have engaged in projects co-funded by Thai government agencies. Many of them create innovative products with technology supported from universities and research organizations. This provides an excellent opportunity for usability to impact the SMEs products and make them more innovative and applicable to user.

In the future, both industry and government should be educated on how usability is important in improving products. In addition, the government should initiate more projects and funding for usability. Moreover, governments should incorporate the usability into industrial standards in order to strengthen product quality. New types of careers related to usability such as usability specialist, interaction designer and user experience designer should be established in Thailand. For the supply side, specialized degree programs in HCI should be established. The programs should emphasize interaction, user experience, usability testing, and user research. The collaboration among faculty from diverse disciplines should be encouraged and supported through a unified community with its own national conference and web site dedicated to usability.

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