

The Application of Universal Design for Enhancing the Quality of Life of the Elderly and Developing the Potential of Community Product Producers

การประยุกต์ใช้การออกแบบเพื่อคนทั้งมวลสำหรับส่งเสริมคุณภาพชีวิตผู้สูงอายุ และพัฒนาศักยภาพผู้ผลิตสินค้าชุมชน

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คำสำคัญ: การออกแบบเพื่อคนทั้งมวล, คุณภาพชีวิตผู้สูงอายุ, ผู้ผลิตสินค้าชุมชน, การออกแบบผลิตภัณฑ์, การพัฒนาเศรษฐกิจชุมชน

Abstract

Background and Objectives: Universal Design is one potential approach for improving the quality of life of elderly individuals, enabling equitable access to products and services regardless of physical limitations. In addition, the development of the potential of community product producers through the concept of universal design can generate economic opportunities and promote the sustainability of community. This research aims to 1) study and compile information on the principles of universal design for enhancing the quality of life of elderly individuals, as well as guidelines for developing the potential of community product producers, 2) develop and apply appropriate design approaches tailored to the physical limitations and behavioral characteristics of the elderly target group, 3) strengthen the potential of community product producers in designing and developing products that meet standard certification requirements, and 4) produce online media that disseminate knowledge on universal design, which can be utilized to support community economic development.

Methods: This research employs a mixed-methods approach combining both qualitative and quantitative methods to study product design guidelines that meet the needs of older adults, as well as to develop the potential of community product producers. The study utilizes in-depth analysis, focus group, and training workshops. The target group consists of 128 elderly people who participated in the seminar project and the community product producers in Nakhon Ratchasima province. It involves a systematic operational process and utilizes appropriate research tools for data collection. The research activities are divided into four phases: 1) Study concepts and gather basic information, 2) design and develop the prototype, 3) test and collect data and 4) analyze data and disseminate findings. The quantitative data were analyzed with descriptive statistics, and the qualitative data were analyzed using content analysis and consideration of data coherence.

Results: Applying universal design approach in product development can significantly improve the quality of life for the elderly. The most favored products included crayon coloring sets (39.84%), fabric bags (17.96%), and fabric hats (14.84%). The elderly selected products based on physical limitations e.g., vision and mobility, time required to complete tasks, and personal preferences. As for the community product producers, the research led to the development of 30 prototype products, six of which successfully passed product standard certification. Moreover, the research team produced 12 educational video clips shared via YouTube and Facebook, promoting accessible and continuous learning. From the findings, it can be concluded that universal design can be effectively applied to enhance the quality of life of the elderly and the potential of community product producers. Future development should focus on designing the products that address physical limitations of the elderly while promoting sustainable community economies.

Application of this study: For applying universal design concepts in community contexts, 1) there should be a development of training programs to enable the elderly to learn new skills and apply them in establishing careers, such as designing products that can be used in daily life or developing online platforms to assist the elderly in selling their own products. 2) There should also be more designed products suitable for the elderly with specific

limitations, such as products for the elderly with severe physical limitations, including medical assistive devices or furniture designed to accommodate the use of those with osteoarthritis. The use of lightweight materials, ergonomic designs, and colors that enhance visibility is also essential. Community products should be linked to online markets and distribution channels that can directly reach target consumers, such as e-commerce platforms specifically designed to support products made by older adults.

Conclusions: This research focuses on the application of universal design concepts to enhance the quality of life for the elderly and to develop the potential of community product producers. Specifically, the community product manufacturers understand the importance of products for the elderly and have gained insight into developing new health-promoting products. The research found that the design guidelines derived from this study can boost the self-confidence of elderly individuals in product design and development. Furthermore, it was found that developing community products using this concept can enhance their competitiveness and create economic opportunities for household and community producers, leading to improved quality of life.

บทคัดย่อ

ที่มาและวัตถุประสงค์: การออกแบบเพื่อคนทั้งมวล (universal design) เป็นแนวทางหนึ่งที่สามารถช่วยพัฒนาคุณภาพชีวิตของผู้สูงอายุโดยทำให้สามารถเข้าถึงผลิตภัณฑ์และบริการได้อย่างเท่าเทียม นอกจากนี้ การพัฒนาศักยภาพของผู้ผลิตสินค้าชุมชนผ่านแนวคิด การออกแบบเพื่อคนทั้งมวล ยังสามารถสร้างโอกาสทางเศรษฐกิจและส่งเสริมความยั่งยืนของสินค้าชุมชน งานวิจัยนี้มีวัตถุประสงค์คือ 1) เพื่อศึกษาและรวบรวมข้อมูลเกี่ยวกับหลักการออกแบบเพื่อคนทั้งมวลสำหรับส่งเสริมคุณภาพชีวิตของผู้สูงอายุ และแนวทางในการพัฒนาศักยภาพของผู้ผลิตสินค้าชุมชน 2) เพื่อพัฒนาและประยุกต์ใช้แนวทางการออกแบบที่เหมาะสมกับผู้สูงอายุ โดยพิจารณาจากข้อจำกัดทางกายภาพและพฤติกรรมของกลุ่มเป้าหมาย 3) เพื่อเสริมสร้างศักยภาพของผู้ผลิตสินค้าชุมชนในการออกแบบและพัฒนาผลิตภัณฑ์ที่สามารถเข้าสู่กระบวนการชอรับรองมาตรฐาน และ 4) เพื่อผลิตสื่อออนไลน์สำหรับเผยแพร่องค์ความรู้เกี่ยวกับการออกแบบเพื่อคนทั้งมวลที่สามารถนำไปใช้ประโยชน์ในการพัฒนาเศรษฐกิจชุมชน

วิธีการศึกษา: การวิจัยนี้ใช้แนวทางผสมผสานระหว่างวิธีเชิงคุณภาพและเชิงปริมาณเพื่อศึกษาแนวทางการออกแบบผลิตภัณฑ์ที่ตอบสนองความต้องการของผู้สูงอายุ รวมถึงการพัฒนาศักยภาพของผู้ผลิตสินค้าชุมชน โดยใช้วิธีการวิเคราะห์เชิงลึก การสนทนากลุ่ม และการจัดอบรมเชิงปฏิบัติการ กลุ่มเป้าหมายประกอบด้วยผู้สูงอายุ 128 คนที่เข้าร่วมโครงการสัมมนาและผู้ผลิตสินค้าชุมชนในจังหวัดนครราชสีมา มีขั้นตอนการดำเนินงานที่เป็นระบบ และใช้เครื่องมือวิจัยที่เหมาะสมในการเก็บรวบรวมข้อมูล การดำเนินงานวิจัยแบ่งออกเป็น 4 ระยะ 1) ศึกษาแนวคิดและรวบรวมข้อมูลพื้นฐาน 2) ออกแบบและพัฒนาโมเดลต้นแบบ 3) ทดลองใช้และเก็บข้อมูล และ 4) วิเคราะห์ข้อมูลและเผยแพร่ผลงาน ข้อมูลเชิงปริมาณ วิเคราะห์ด้วยสถิติเชิงพรรณนา (descriptive statistics) ข้อมูลเชิงคุณภาพวิเคราะห์โดยใช้วิธีการวิเคราะห์เนื้อหา (content analysis) และการพิจารณาความสอดคล้องของข้อมูล

ผลการศึกษา: การออกแบบผลิตภัณฑ์โดยใช้แนวคิดการออกแบบเพื่อคนทั้งมวล (universal design) สามารถช่วยให้ผู้สูงอายุมีคุณภาพชีวิตที่ดีขึ้น โดยผลิตภัณฑ์ที่ได้รับความนิยมสูงสุด ได้แก่ ชุดระบายสีเทียน (39.84%) กระเป๋าคาด (17.96%) และหมวกผ้า (14.84%) ทั้งนี้ ผู้สูงอายุให้เหตุผลในการเลือกผลิตภัณฑ์จาก ข้อจำกัดทางกายภาพ เช่น สายตาและการเคลื่อนไหว ระยะเวลางาน และความชอบส่วนบุคคล ในส่วนของกลุ่มผู้ผลิตสินค้าชุมชน การวิจัยได้พัฒนาผลิตภัณฑ์ต้นแบบ 30 รายการ โดยมี 6 กลุ่ม ที่สามารถเข้าสู่กระบวนการชอรับรองมาตรฐานผลิตภัณฑ์สำเร็จ นอกจากนี้ ทีมวิจัยได้พัฒนาสื่อออนไลน์ 12 คลิปวิดีโอ เพื่อเผยแพร่ความรู้ผ่านช่องทาง YouTube และ Facebook ทำให้เกิดการเรียนรู้ที่ต่อเนื่องและเข้าถึงได้ง่าย จากผลการศึกษาสามารถสรุปได้ว่า การออกแบบเพื่อคนทั้งมวลสามารถประยุกต์ใช้ในการส่งเสริมคุณภาพชีวิตของผู้สูงอายุและพัฒนาศักยภาพของผู้ผลิตสินค้าชุมชน ได้อย่างมีประสิทธิภาพ การพัฒนาในอนาคตควรมุ่งเน้น การสร้างผลิตภัณฑ์ที่คำนึงถึงข้อจำกัดทางกายภาพของผู้สูงอายุและการส่งเสริมเศรษฐกิจชุมชนอย่างยั่งยืน"

การประยุกต์ใช้: การนำแนวคิดการออกแบบเพื่อคนทั้งมวลไปประยุกต์ใช้ในระดับชุมชน 1) ควรมีการพัฒนาโครงการฝึกอบรมเพื่อให้ผู้สูงอายุสามารถเรียนรู้ทักษะใหม่ ๆ และนำไปใช้ในการสร้างอาชีพ เช่น การออกแบบผลิตภัณฑ์ที่สามารถใช้ได้ในชีวิตประจำวัน หรือการพัฒนาแพลตฟอร์มออนไลน์เพื่อช่วยให้ผู้สูงอายุสามารถจำหน่ายสินค้าของตนเองได้ 2) ด้านการออกแบบผลิตภัณฑ์ที่เหมาะสมกับผู้สูงอายุที่มีข้อจำกัดเฉพาะ ควรมีการพัฒนาผลิตภัณฑ์ที่ตอบสนองต่อความต้องการของผู้สูงอายุที่มีข้อจำกัดทางกายภาพที่รุนแรง เช่น อุปกรณ์ช่วยเหลือทางการแพทย์ หรือเฟอร์นิเจอร์ที่ออกแบบให้รองรับการใช้งานของผู้ที่มีภาวะข้อเข่าเสื่อม การใช้วัสดุที่น้ำหนักเบา จับถนัดมือ และมีสีที่ช่วยเพิ่มการมองเห็น ควรมีการเชื่อมโยงสินค้าชุมชนกับตลาดออนไลน์และช่องทางจำหน่ายที่สามารถเข้าถึงกลุ่มเป้าหมายได้โดยตรง เช่น แพลตฟอร์ม e-commerce ที่ออกแบบมาเพื่อรองรับสินค้าของผู้สูงอายุ

บทสรุป: การวิจัยนี้มุ่งเน้นการประยุกต์ใช้แนวคิดการออกแบบเพื่อคนทั้งมวล (universal design) เพื่อส่งเสริมคุณภาพชีวิตของผู้สูงอายุและพัฒนาศักยภาพของผู้ผลิตสินค้าชุมชน โดยเฉพาะผู้ผลิตสินค้าชุมชน เข้าใจถึงความสำคัญของผลิตภัณฑ์สำหรับผู้สูงอายุ และได้แนวทางในการพัฒนาผลงานใหม่ที่เป็นสินค้าในกลุ่มส่งเสริมสุขภาพ ผลการวิจัยพบว่า แนวทางการออกแบบที่ได้จากงานวิจัยนี้สามารถ สร้างความมั่นใจในตนเองของผู้สูงอายุในการออกแบบและพัฒนาสินค้า นอกจากนี้ยังพบว่า การพัฒนาสินค้าชุมชนโดยใช้แนวคิดนี้สามารถช่วยเพิ่มขีดความสามารถในการแข่งขันของผลิตภัณฑ์ และสร้างโอกาสทางเศรษฐกิจให้กับผู้ผลิตในระดับครัวเรือนและชุมชน ส่งผลให้มีคุณภาพชีวิตที่ดีขึ้น

Introduction

The transition into an aging society is a pressing issue faced by many countries worldwide, including Thailand, where the proportion of elderly individuals is steadily increasing (National Statistical Office, 2021). Key factors influencing the quality of life among older adults include physical health, mental well-being, and opportunities for social participation (World Health Organization (WHO), 2021). However, many elderly individuals continue to experience social isolation (Smith & Victor, 2019 : 86 - 87), a lack of health-promoting activities, and a perception of being a burden to their families. Universal Design is one potential approach to improving the quality of life for elderly individuals, enabling equitable access to products and services regardless of physical limitations (Center for Universal Design, 1997; Imrie, 2012 : 873 - 882). In addition, the development of the potential of community product producers through the concept of universal design can generate economic opportunities and promote the sustainability of community products (Steinfeld & Maisel, 2012; Palee, 2024 : 482 - 502). This research therefore aims to examine and apply the concept of universal design in developing a design model that addresses the needs of both elderly individuals and community product producers.

Research Objectives

1. To study and compile information on the principles of universal design for enhancing the quality of life of elderly individuals, as well as guidelines for developing the potential of community product producers.
2. To develop and apply appropriate design approaches tailored to the physical limitations and behavioral characteristics of the elderly target group.
3. To strengthen the potential of community product producers in designing and developing products that meet standard certification requirements.
4. To produce online media that disseminates knowledge on universal design, which can be utilized to support community economic development.

Research Methods

This study employs a mixed-methods approach, integrating both qualitative and quantitative research methods. It involved field studies and experimental research to assess the impact of universal design on the quality of life of elderly participants, as well as on the potential development of community product producers.

1. Population and Sample

The study focused on two main target groups

1.1 Phase 1: Study concepts and gather basic information

To find the suitable ways to develop design concepts, using a sample group. 128 elderly individuals residing in Nakhon Ratchasima province. The sample size was determined using Taro Yamane's ready-made table at a 95 % confidence level and a 10% margin of error.

1.2 Phase 2: Design and prototype development

Community product producers were involved in the development of 30 prototype products. This was a purposive sampling method participants based on their suitability for the research. The chosen sample group had the potential to

participate throughout the project, produce the work within the specified timeframe, were in good health, and free from serious underlying medical conditions. Examples include groups producing Thai Yuan in Sikhiu district, Nakhon Ratchasima province, knitting groups, and groups making crafts from fabric scraps.

2. Research Instruments

The data collection tools included:

2.1 Questionnaires

Questionnaires were used to assess the satisfaction of elderly participants with the designed products. The instrument was validated by analyzing the index of content validity (IOC) evaluation results. This analysis determined the content validity for each objective or purpose in relation to the research questionnaire.

2.2 In-depth Interviews

Elderly participants and product producers were interviewed to explore factors influencing product selection.

2.3 Focus Group Discussions

These involved design experts, elderly participants, and community product producers to jointly analyze appropriate design approaches.

2.4 Product Usability Testing

Elderly users tested the products and provide feedback on usability and comfort.

3. Research Procedure

This research employs a mixed-methods approach combining both qualitative and quantitative methods to study product design guidelines that meet the needs of older adults, as well as to develop the potential of community product producers. It involves a systematic operational process and utilizes appropriate research tools for data collection. The research activities are divided into four phases, as outlined in Table 1

Table 1 Research Procedure

Phase	Description	Activities
Phase 1	Study concepts and gather basic information	- Literature review on related topics - Study of universal design principles - Selection of participants
Phase 2	Design and prototype development	- The discussion on product design for promoting health for the elderly, (Gaow Goods #1), and the focus group brainstorming session. - Workshop training project Gaow Goods (Gaow Goods#2): Uniting the Elderly, We Can Do It. - Creating a prototype of products suitable for the elderly - Development of learning materials for community product producers
Phase 3	Testing and data collection	- Organize activities for the elderly to try out the products - Collect data from questionnaires and interviews

4. Research Framework

This study adopted a research and development (R&D) framework that combined quantitative and qualitative techniques. The research model is illustrated in Figure 1

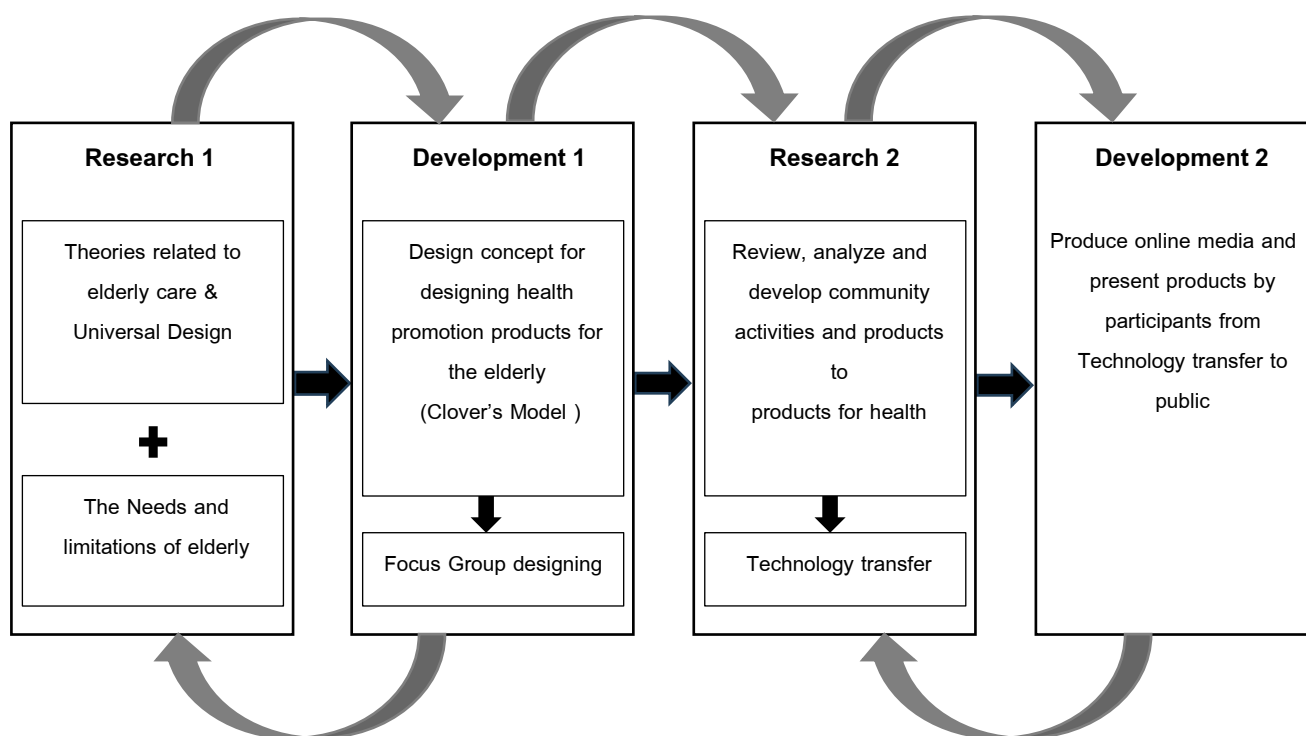


Figure 1 Research Conceptual Framework

(Source: Na Nongkai, 2021 : 4)

5. Data Analysis

Quantitative data were analyzed with descriptive statistics such as mean, standard deviation, and percentage. Qualitative data were analyzed using content analysis and consideration of data coherence.

Research Results

1. Demographic Information of the Sample Group: Gaow Goods #1

The sample group consisted of 128 elderly individuals and 30 community product producers. Most of the elderly participants were female (54.68%) and fell within the age range of 60–69 years (66.41%), an age group that remains physically active and capable of participating in various activities.

2. Satisfaction with the Training Workshop: Gaow Goods #2 – Uniting the Elderly, We Can Do It

The findings revealed a high level of satisfaction among elderly participants regarding the workshop activities. The average satisfaction scores are shown in Table 2.

Table 2 Results of Satisfaction Data Analysis Regarding the Workshop Training Activities of Gaow Goods #2: Uniting the Elderly, We Can Do It. (n=128)

Evaluation Criteria	Mean ($\bar{X}$)	Standard Deviation (SD)	Satisfaction Level
The interest of the project	4.50	0.42	Highest
Format, duration, and venue	4.30	0.42	High
Impact on quality of life after participation	4.60	0.42	Highest
Overall	4.46	0.33	High

The attractiveness of the project had the highest satisfaction ($\bar{X}$ = 4.50, SD = 0.42); the format, duration, and location of the training received a high level of satisfaction ($\bar{X}$ = 4.30, SD = 0.42); and the impact on the quality of life after participating in the project received the highest satisfaction ($\bar{X}$ = 4.60, SD = 0.42). The overall assessment of all aspects of this activity indicated a high level of satisfaction ($\bar{X}$ = 4.46, SD = 0.33), demonstrating that the design of the activity can motivate and provide enjoyment for the elderly.

3. Development of Community Products

Through the project, a total of 30 prototype products were developed using sketch design and 3D model development processes.



Figure 2 Example of Sketch Design Product

(Source: Na Nongkai, 2021 : 96)

Figure 2 presents conceptual design sketches for products promoting elderly health, built upon existing community products. These sketches help older adults visualize how local products can be further developed while maintaining traditional materials and production methods. Additionally, the researcher sketched design concepts incorporating simple tools to make handicraft work easier. These concepts demonstrate to older artisans that product development does not need to be limited to traditional forms, but can also include design solutions that improve their working efficiency and overall quality of life.

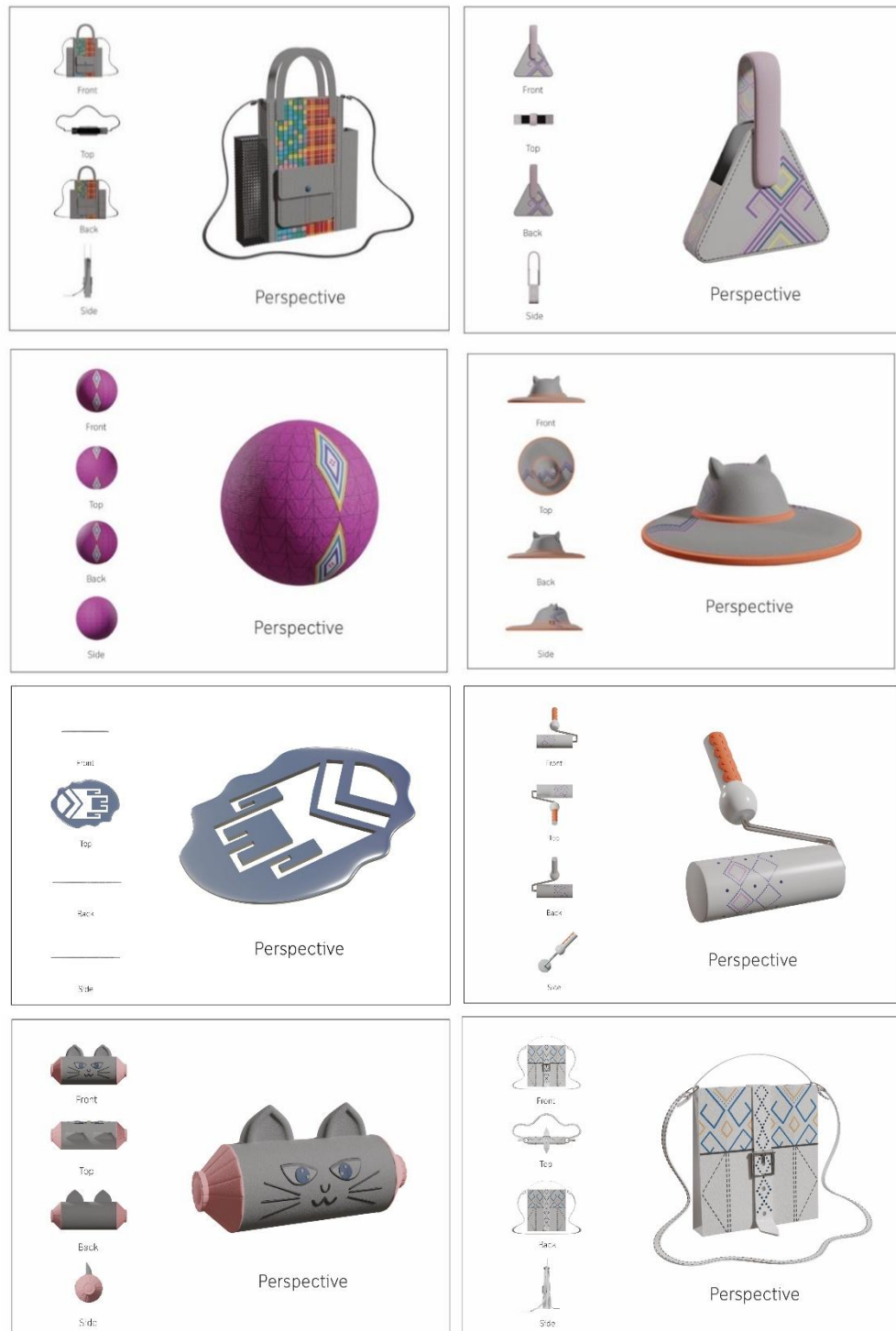


Figure 3 Example of the Development of a 3D Model Product

(Source: Na Nongkai, 2021 : 97)

The results of the product development indicated that the elderly showed interest in the following training sets: the most popular training activity among elderly participants was the crayon coloring set (39.84%), followed by fabric bags (17.96%) and fabric hats (14.84%). Other preferences included watercolor sets (10.93%), crocheted balls (8.59%), and an equal interest in fabric design kits and hand pillows (3.9%). Shoes were the least preferred, receiving 0% interest.

The factors influencing the choice of training sets through in-depth interviews with 30 elderly representatives regarding their reasons for selecting each training set can be summarized by 1) physical limitations such as vision, hand dexterity, and ability to sit for extended periods; 2) the time required to complete the activities; and 3) personal preferences and skills, such as a fondness for drawing or sewing.

From the processes, the researcher synthesized the obtained data into a design model to be used as a guideline for designing health promotion products for the elderly, inspired by the Clover model.

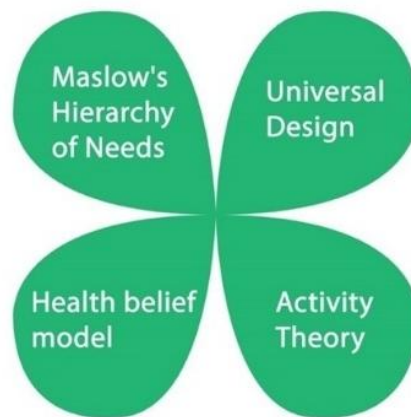


Figure 4 The Design Concept of the Clover Model

(Source: Na Nongkai, 2021 : 98)

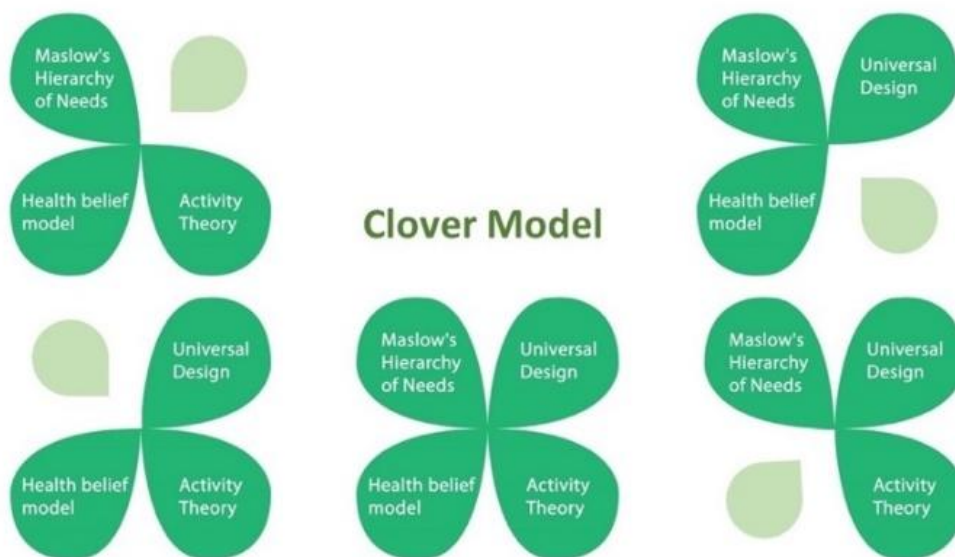


Figure 5 The Components of the Design Concept of the Clover Model

(Source: Na Nongkai, 2021 : 99)

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It can be seen from the image of the clover Model Figure 4 and 5 above that each leaf represents the knowledge that should be considered in designing products to enhance the quality of life for the elderly, comprising the relevant concepts and theories in the following four areas: Marlow's Hierarchy of Needs, Universal Design, Health Belief Model, and Activity Theory. These indicate that in each design endeavor, the designer should consider these four factors to achieve the best and most appropriate results. However, if a particular project only focuses on three of these aspects, it is not necessarily incorrect or inappropriate.

4. The Exhibition Results of the Gaow Goods # 3

A showcase (Show-Gaow) of uniqueness at the Thailand Friendly Design Expo 2022, was held at the Bangkok International Trade & Exhibition Centre (BITEC) from February 10 to 13, 2022. Table 3 reveals the results of the data analysis according to each topic: The overall index for the exhibition booth shows the highest satisfaction ($\bar{X}$ = 4.60, SD = 0.43), while the quality of products and purchasing decisions indicates a high level of satisfaction ($\bar{X}$ = 4.14, SD = 0.35). The overall satisfaction across all aspects regarding the products and the exhibition showcasing Gaow Goods#3: Show Gaow Hai Rao Do, demonstrates a high level of satisfaction ($\bar{X}$ = 4.37, SD = 0.30).



Figure 6 Exhibition Booth Design Approved for Participation in the Exhibition

(Source: Na Nongkai, 2021 : 121)



Figure 7 Overview of Products Photographed in the Studio

(Source: Na Nongkai, 2021 : 126)

Figure 7 presents photographs of products designed and crafted by older adults following their participation in a technology transfer project. By applying Clover's Model (Maslow, 1943) to product development "by the elderly, for the elderly," the initiative enabled participants to realize their capability to add value and develop new products while continuing to utilize familiar traditional materials and production processes.

Table 3 Results of the Evaluation Data Analysis on Satisfaction With the Products and the Exhibition of Gaow Goods (Gaow Goods#3): Show Gaow Hai Rao Do (n=128)

Evaluation Criteria	Mean ($\bar{X}$)	Standard Deviation (SD)	Satisfaction Level
Overview of the Exhibition Booth	4.60	0.43	Highest
Product Quality and Purchase Decision	4.14	0.35	High
Overall	4.37	0.30	High

5. Application of This Study

The study results indicate that universal design is not limited to product design, but can also be applied to promote education, self-development, and economic status in communities. Examples from Japan (Ministry of Health, Labour and Welfare, Japan, 2021), where empowering work fostered a strong sense of pride, and Sweden (World Health Organization, 2007) demonstrate that design addressing the needs of the elderly helps them maintain their societal roles and generate income through local skills and wisdom. However, the research also identified certain limitations, such as elderly individuals with dementia or severe physical impairments, who may require more specialized design considerations.

6. Practical Recommendations

6.1 The application of universal design at the community level: There should be the development of training programs to enable the elderly to learn new skills and apply them in establishing careers, such as designing products that can be used in daily life or developing online platforms to assist the elderly in selling their own products.

6.2 The design of products suitable for the elderly with specific limitations: There should be the development of products that cater to the needs of the elderly with severe physical limitations, such as medical assistive devices or furniture designed to accommodate the use of those with osteoarthritis. The use of lightweight materials, ergonomic designs, and colors that enhance visibility is also essential.

6.3 Support from government and private sectors: There should be a policy to support the elderly in the development of products utilizing universal design and to promote community products to access broader markets through marketing assistance and branding initiatives. It is essential to link community products with online markets and sales channels that can directly reach the target audience, such as e-commerce platforms specifically designed to accommodate products for the elderly.

7. Recommendations for Future Research

7.1 Study the impact of universal design on the elderly in diverse contexts. There should be comprehensive studies on elderly groups with different health conditions, socioeconomic status, and cultures to understand the factors affecting their utilization of products designed with this concept.

7.2 Compare the implementation of universal design in countries with different policies that support the elderly. There should be a comparative study between countries that have implemented the concept of universal design at the policy level, such as Japan, Sweden, and the United States, to identify approaches suitable for the context of Thailand.

7.3 Study the feasibility of developing a business model that utilizes universal design as a selling point. There should be a study on the business opportunities of products designed under the concept of universal design, examining how they can create added value in the market and their potential for future expansion.

Universal design is a concept that can be widely applied and is beneficial to the elderly in various dimensions, including the enhancement of quality of life, education, and the creation of economic opportunities. Findings indicate that designing products with the needs of the elderly in mind can help reduce physical limitations and increase opportunities for social participation. Nonetheless, the successful implementation of this concept necessitates support from multiple sectors, including the public sector, private sector, and community, to develop approaches that genuinely address the needs of the elderly.

Conclusions and Discussion

In conclusion, universal design is a versatile concept that can be applied to improve the quality of life of the elderly in multiple dimensions including health, education, and the economy. However, its implementation must consider the diversity of the elderly population and develop approaches that respond to their varied needs.

The results of this study revealed that 1) elderly participants experienced an improvement in their quality of life after participating in the project and reported a high level of satisfaction; 2) community products were successfully developed and certified, enabling them to compete in the market; and 3) the research process led to the creation of prototype activities that can be adapted and applied to other communities.

Base on the findings of the present study, together with established concepts reported in previous literature, the Clover Model was developed as an integrated framework for elderly health promotion.

The Clover Model is conceptually represented by a four-leaf clover, with each leaf corresponding to one of four established theoretical perspectives adopted and integrated in the present study including with Maslow's Hierarchy of Need (Maslow, 1943) Universal Design, Health Belief Model and Activity Theory these established perspectives provide the theoretical foundation for the development of the Clover Model.

The model suggests that these four components should be considered during the design process to achieve the most appropriate and beneficial outcomes for elderly users.

The findings of this study indicate that universal design plays a significant role in improving the quality of life of the elderly. It helps reduce physical limitations and enables them to live more safely and independently. This aligns with the perspective of the Center for Universal Design (1997), which asserts that universal design is a design principle that ensures equal access to and use of environments for all individuals. Steinfeld & Maisel (2012) also support this, stating that universal design helps reduce accidents among the elderly and promotes independence. However, Imrie (2012) argues that universal design may not fully meet the needs of all user groups due to the diversity of elderly individuals' needs. This corresponds with findings in the present study, which show that some elderly people with dementia still face difficulties using certain products.

Beyond physical design, universal design also plays a key role in promoting education and personal development among elderly individuals. Research in Japan shows that adjusting physical learning spaces such as education centers designed according to universal design principles enables the elderly to engage more actively in educational and social activities (Wilson, 2001). In Thailand, the 4H concept (Heart, Head, Hand, Health) emphasizes that universal design should serve as a tool to help the elderly engage in lifelong learning, particularly in mental health and preparation for aging, universal design and the community economy, as well as local wisdom development. The research found that applying universal design to the development of community products increases their economic value at both the household and community levels. The "Gaow Goods" project in Thailand demonstrates that the elderly can apply artistic and craft skills to design products tailored to the senior market. This helps generate supplementary income and creates post-retirement job opportunities (Faster Capital, 2025)

Factors influencing the selection of training sets, as determined through in-depth interviews with 30 elderly representatives, regarding their reasons for choosing each set, can be summarized into 1) Physical limitations such as eyesight, finger dexterity, movement, and prolonged sitting; 2) the time required to create the work; and 3) personal preferences and aptitudes such as a liking for drawing or sewing. Even though some elderly individuals were beginning to show symptoms of Alzheimer's and Parkinson's disease, with tremors and forgetfulness, they still attempted to follow the drawing steps taught by the researcher, despite caregivers telling them they could draw however they wanted. Furthermore, their effort to complete the work resulted in a great sense of self-pride, which aligns with a study in Japan (Ministry of Health, Labour and Welfare of Japan, 2021), another example of successfully using universal design to promote the employment of the elderly. The Japanese government has supported the "Silver Human Resources Centers" project, which enable the elderly to use their skills and expertise in low-strain jobs such as handicrafts, agriculture, and services. These jobs are designed to be safe, easy to use, and directly meet the needs of the elderly consumer market (Ministry of Health, Labour and Welfare of Japan, 2021). Additionally, Sweden has early on developed "Age-friendly Urban Design" by incorporating universal design to create environments conducive to elderly work. For example, Vingåker Municipality in Sweden has implemented a strategy for an age-friendly community based on the WHO framework to establish an ecosystem that supports healthy aging and local civic engagement (World Health Organization, 2007). This is similar to Thailand's approach, which subsequently adopted a strategy promoting local wisdom through accessible local markets, handmade product spaces, and online platforms to help elderly citizens sell their goods. As mentioned above, all aspects are consistent in their use of handicrafts as a basis for promoting the health of the elderly.

In summary, universal design influences not only the physical environment but also lifelong learning and self-development for the elderly. Examples from Thailand and Japan show that it helps seniors access educational opportunities and develop life skills. Moreover, universal design is vital to the community economy, enabling the elderly to use their local wisdom and skills to create products. This model has proven effective in Thailand, Japan, and Sweden. Although universal design can help improve the quality of life of the elderly, it still has some challenges, especially for the elderly with dementia or severe physical disabilities. These cases may require more specialized design solutions. Overall, universal design is a practical approach for improving elderly quality of life across various dimensions, including health, education, and community economy. Nevertheless, the application must consider the diversity of the elderly population and develop approaches that respond to their varied needs.

According to the findings, community product producers participating in the project were able to develop 30 prototype products, and 6 groups of elderly were able to enter the process of obtaining product certification standards. This reflects that inclusive design can be used as a strategy to enhance the potential of community products. This result is consistent with Porter's (1998) concept that the development of community-level economies relies on innovation and product differentiation. Particularly, designing products that meet the specific needs of niche consumers, such as the elderly, can enhance the competitiveness of community products in the market. However, the research by Kotler & Keller (2012) indicates that while developing products suitable for the elderly can enhance economic value, marketing factors and distribution channels remain significant obstacles that need to be addressed. This aligns with our findings that, despite product development, there is still a lack of clear marketing channels. Although universal design is recognized as an approach that helps reduce the limitations faced by the elderly, some studies, such as that of Imrie (2012), argue that universal design may not truly meet the needs of all users due to the diversity in the physical and behavioral characteristics of individual elderly people. That is consistent Haenjohn et al. (2024 : 451–459) who found that best practices of healthy ageing consist of having good health, brain health, mental health, good relationships, and financial stability. Additionally, healthy ageing initiatives should target middle-aged adults starting from the age of 40. (World Health Organization, 2020)

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