

Innovative Design Process for Better Health

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Abstract:

Innovation means new ideas and implementation using knowledge and creativity. New designs may be in the form of processes, products, or concepts, which can be used to benefit development of materials or products not yet commercially available. The objective is to create patterns or processes for healthy interior decoration for people who are allergic to dust mites. These methods divided 2 parts, as follow; Part 1: A study of the conditions, problems, and composition of the form or process for healthy interior decoration for people who are allergic to dust mites and Part 2: Creating a format or process for healthy interior decoration for people who are allergic to dust mites. The results of Innovation Design education are, therefore, an exciting topic. This research and its application in PHD consist of four phases of operation before entering commercial use, which are: 1. Survey and Identify 2. Co-Creation 3. A Marketing Test. 4. The PHD Business Model Canvas plans which there are an idea in the development of the interior design process and interior construction that can meet individual needs - personalization - in order to develop process innovation with value proposition that can respond to personalized health and allergy needs. Convenience and simplicity of use, along with accuracy standards, can help to reduce mistakes in the interior design process. This research looks at the health problems encountered and sees opportunities to create value in the current interior decoration process by synthesizing new work processes and establishing knowledge management

Keywords: *innovative design process, interior decoration, health.*

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Introduction

Environmental management is one of the key factors in helping to take care of health and prevent illness. In the past, research and implementation of the theory of 'A Theory of Supportive Design,' by Roger S. Ulrich, discussed design for adaptation. The environment in a residence or in a hospital can

help patients reduce stress and anxiety while increasing relaxation and help to alleviate illnesses (Ulrich, 2000; Centers for Disease Control and Prevention, 2014). The research study 'Therapy by Design,' conducted at a private hospital in England, attempted to improve the physical environment and the society within the hospital itself in order to help

treat patients' symptoms (Gesler et al., 2004). There is also research on home design that addresses health and environmental sustainability. Previous studies have focused on materials and improving the environment for patients' general health (Loftness et al., 2007; Dong et al., 2014; Wang et al., 2016). There is still no research and data to help with design to improve the living environment for patients with allergies and respiratory allergies.

In addition to traffic problems resulting in global warming and higher pollution, the environment in the Thai capital city is densely populated. Dust from cars and buildings and coolant from air conditioners inside buildings, as well as the exhaust from the operation of machinery and facilities, all has an impact on the environment, including pollution and hotter temperatures (Kittikhun, 2019). Moreover, the fast-paced and competitive way of life causes tension, which exacerbates health problems (Asanasen, 2012). In the past several years, Thai health expenditures have increased significantly, with three-quarters of the cost of health care going to medical services, while only five percent of that cost goes towards disease prevention and health promotion (WHO, 2015). Thailand needs to increase its investment in health care, especially as it relates to disease prevention and health promotion (Ministry of Finance, 2017). Data from a 2016 survey, published in the Euro Monitor International in 2017, found that the consumption of health-related products, including vitamins and supplements, herbal products, alternative medicine, baby goods, and allergy remedies increased steadily. In 2011, the total amount of money spent on health care consumption was 55,274,200 baht. By 2016, that number had increased to 86,746,200 baht. Allergy care products increased every year from 2011 to 2016, representing a 44% growth rate. In 2016, the cost of products for the care of allergies rose to approximately 1,328,800 baht (International, 2016).

Treatment from the past to the present still focuses on drug treatment rather than health care to

prevent illness. Therefore, the National Strategic Framework for Health Promotion and Prevention 2011-2015, focuses on the development of health and environment promotion for sustainable good health. The objective is development in health promotion and supporting the use of innovations in health care by focusing on chronic diseases that are not contagious (non-communicable diseases). Allergies are chronic diseases that fall into this group. Therefore, attempts are made to improve the health of patients with these diseases through prevention that is sustainable and healthy as a means of reducing medication use and medical expenses (Krieger, 2010; Ministry of Public Health, 2011).

The evolution of approaches to health care has changed, from acute treatment to becoming more focused on the prevention of chronic diseases by involving people in taking ownership of their own health care (Saengchai, Pattanapongthorn, & Jernsittiparsert, 2019). Innovations in health care rely on joint strategies between patients and specialists in the development and design of the process. The results are guided by professionals, such as specialist doctors. In addition, focus on co-production and creation includes owners and designers in providing creative ideas for space usage and aesthetics that are in line with the natural environment and meet the needs of the users (Freire & Sangiorgi, 2010). Responsibility for various health needs is in accordance with health interests in each area of this research to prevent respiratory allergies.

The objective is to create patterns or processes for healthy interior decoration for people who are allergic to dust mites. This research looks at the health problems encountered and sees opportunities to create value in the current interior decoration process by synthesizing new work processes and establishing knowledge management. Surveying the attitudes of residents in the downtown area of Bangkok regarding interior design and its effects on health will include a study of the relationship between interior materials and dust

mites in different climate conditions. Creating healthy interior designs for people who are allergic to dust mites can improve the health of allergy patients. Applied technology can modify methods that will reduce the steps of the process, saving time, reducing mistakes, and therefore increasing efficiency in accessing health information materials, as well as the ability to respond to target groups with specific needs, such as parents and children. Results of the research will be applied to manage the interior decoration process and will be of benefit at a suitable level for users, which will help create added value for the industry and will assist research in this field in the future.

Literature Review

There is a need to improve the interior environment of residential apartment types in the city, in addition to managing the most useful areas of customers in high-income cities. Style and decoration reflect the modern taste of the homeowner. However, with the current general interior design and construction process, there are a variety of processes and procedures, including information on the properties of materials, that are limited and lack systematic data storage and search capabilities for use. Therefore, there is very little response to the specific needs of the health of people with allergies. The interior design and condominium type which is condominium interior design and construction is a complex process at each step (Christine, 2014). From the project developer to the purchaser of the condominium unit, each person needs to have contact and coordination with many parties, such as designers, contractors, materials distributors, furniture suppliers, and the stores that sell appliances. The general interior decoration process currently consists of the following main processes (Joseph, 2001; Mary, 2012):

1. Selection of interior design professionals

The decision to use a specific designer is influenced by many factors, including creativity, past work, and recommendations from

those who have used the service previously. Designers typically cost approximately 10% of the budget for interior decoration, yet there are currently no designers with expertise in interior design specifically with health and respiratory allergies in mind.

2. Design and drawing

This process is very important, because the needs of the residents must be considered in order to create the interior design. There must be at least three meetings in order to summarize the design and present the results as a sketch. The potential problem, the lack of information on interior materials that are safe for residents' health at the medical grade level, has not yet been collected and organized systematically and at reliable standards, causing the design and selection of materials to be limited and ineffective.

3. Valuation of interior decoration fees

Assessment of the middle price point of the interior decoration contractor fee is done in order to consider budget compatibility and aid with contractor selection. The problem is that most assessments are ignored by the designer, which then has a tendency to elevate the price and is one cause of a budget escalating beyond the agreed upon limit.

4. Contractor selection with quotation

Selecting and comparing the qualifications of contractors that are suitable for performing the work required is essential. It is difficult to compare prices when the work to be done is not of equal quality or content. Assessing the quality of a contractor's previous work can be beneficial, though each job is different, and any additional work must be valued accordingly. A contract that has an undefined work schedule can lead to discrepancies in the amount of money paid for each installment.

5. Construction and interior decoration

This process is important to control the quality of the materials used, the installation methods, and the skilled technicians for each type of work. The problem is that the owner usually does

not know the technical procedures and installation methods of the work, the contractor frequently takes more time than originally planned, the quality of work is not suitable, and the contractor leaves the job.

6. Monitoring the progress of construction and interior decoration work

Inspection of the materials and the progress of the contractor's work prior to payment can be difficult due to a lack of understanding by the customer as to how the work, materials, and installation should be progressing and whether or not they are of the standard agreed to in the contract.

7. Payment of installments

Payments may be made in cash, by check, or by bank transfer, according to the progress of the work and schedule of payments specified in the contract. Problems can occur when there is a discrepancy between the customer and the contractor over the quality and standards of the work being done.

8. Procurement of furniture and accessories, as well as home appliances

The procurement of furniture and home appliances chosen from various locations is done according to the designer's recommendations, as well as from information from media advertisements. A limited amount of information and advice can result in hesitation and uncertainty about what is appropriate for the location and what will meet the consumers' needs. A multitude of distributors, as well as a variety of quality products for health and allergies, requires communication with designers or experts to facilitate their selection.

9. Submitting and receiving interior decoration work

Checking the details and the quality of the work, along with completed documentation, for any items that are defective or damaged, takes time, as does any necessary repair work, and includes the delivery of warranty documentation from manufacturers and distributors of decorative products.

These nine steps are part of the general interior decoration process. There are several sub-steps in which the apartment owners and those involved within the process interact with each other on interior design issues that focus on responding to individual needs related to health care and respiratory allergies (McLeish, 2003). There will be at least four more processes, which are:

1. Searching for designers with experience in residential and health-related designs.

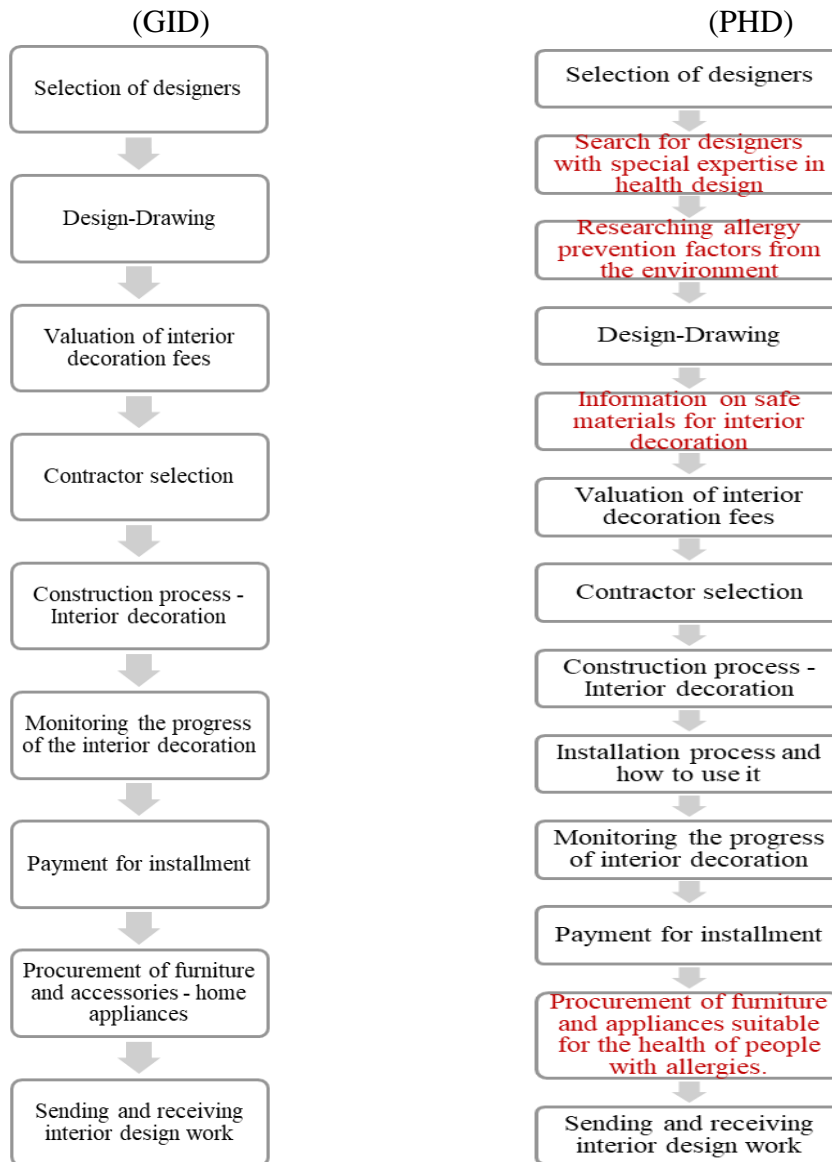
2. Designers and apartment owners researching and finding information about the design, including additional health and disease conditions to arrange a suitable environment.

3. Selecting the properties of materials that are safe from chemicals and do not affect health or stimulate the symptoms of disease requires know-how and information from experts in the field.

4. Selecting furniture and home equipment that is appropriate and meets health standards.

The process is supplemented by data, scientific proof, and information from experts in interior design (Christine, 2011). The process in Figure 1 shows a comparison between the General Interior Design and Construction Process (GID) and the interior design and interior processes to meet regulations specific to health and respiratory allergies the Personalized Interior Health Design and Construction Process, or PHD.

Figure 1. Comparison of the General Interior Design and Construction Process (GID) to the Personalized Interior Health Design and Construction (PHD).



1. Customers' problems

Due to the high price of condominiums, there is a need for cost-effective and unique space. For example, some people want designs that take into account the health issues of themselves and their family members. In addition, some customers do not understand the process of interior decoration and feel that contractors do not concern themselves with finding the most appropriate materials and furnishings for their homes.

2. Problems for the project owner

The project owner does not wish to have a fully finished interior design due to the variety of needs and tastes of the customers. There are many steps and conditions for the completion of the rooms before they can be delivered and occupied.

3. Problems for architects or interior designers

Some designs do not meet the needs of the customers due to the designers' lack of expertise and understanding of specific requirements, such as the selection of safe and healthy materials. Likewise, communication that is inaccurate with the type presented can cause work to be delayed or materials improperly installed, which wastes both time and money.

4. Problems for contractors, manufacturers, or service providers

Discrepancies between the parties involved makes for mistakes on the job. One such area of confusion is an inexact budget, or price range, which can lead to escalating costs. Other difficulties include the contractor leaving the job, products and materials not meeting the standards required, poor job quality, and job completion going beyond the scheduled date (Charles, 2016).

Therefore, there is an idea in the development of the interior design process and interior construction that can meet individual needs - personalization - in order to develop process innovation with value proposition that can respond to personalized health and allergy needs.

Convenience and simplicity of use, along with accuracy standards, can help to reduce mistakes in the interior design process.

Method of research Participants

Research began to search for information on problems occurring in the GID process by looking for evidence to support the concept. Inquiries were made about GID problems by sampling owners of 18 apartment units, namely Noble Pleonchit, The Crest Sukhumvit 34, The Room Sathorn, and Ideo Mobi Sukhumvit 81, all located in the business district and areas near Bangkok's four electric train projects. Problems were classified into six categories, which included the consumer, the developer, the architect, the producer, the distributor, and the contractor, all of whom are directly involved in the GID.

This research is divided into two steps, as follows:

Part 1. A study of the conditions, problems, and composition of the form or process for healthy interior decoration for people who are allergic to dust mites.

Step 1: A study of documents, concepts, and related theories.

This research will look at the conceptual information and theories related to the form or process of interior decoration for people who are allergic to dust mites by studying basic information related to surveying the attitude of residents in the downtown Bangkok area regarding interior decoration effects on health. The study will include the relationship between interior materials and dust mites in different climate conditions as well as the creation of healthy interior designs for people who are allergic to dust mites. Related literature, such as textbooks, books, research, and dissertations that are related to the form or process for healthy interior decoration for people who are allergic to dust mites will be considered, as will consultation and advice

from thesis advisors. Concepts and theories related to healthy interior styles or processes for people who are allergic to dust mites will be analyzed.

2. Data collection will include in-depth interviews with apartment owners, architects, interior decorators, contractors, and doctors and nurses specializing in the treatment of allergies. Opinions from 15 experts will be purposefully sampled to collect data. The information will be analyzed for content, with key points summarized to define the conceptual framework of the research, which will be used to create a questionnaire.

Step 2: Building and developing tools

1. Tools are developed as a questionnaire to use in researching forms or processes for healthy interiors for people who are allergic to dust mites. These structured questionnaires are used by experts to assess quality in interior styles or processes for the health of people who are allergic to dust mites. Five academics will check the Content Validity and Index of Item-Object Congruence (IOC) and use their expert advice to improve and complete the questionnaire.

Step 3: Data collection

1. Data is collected from the questionnaires received from the sample group, including apartment owners, specialist doctors and nurses in allergies, architects, interior decorators, and contractors.

2. Data from the questionnaire is analyzed using descriptive statistics, such as frequency, percentage, mean, and standard deviation, according to the opinions of the data providers.

Part 2. Creating a format or process for healthy interior decoration for people who are allergic to dust mites.

1. The results from the questionnaire analysis are used to create a form or process for healthy interior decoration for people who are allergic to dust mites.

2. An inspection and evaluation of patterns or processes for healthy interior decoration is made to aid people who are allergic to dust mites by presenting five experts in a focus group discussion.

3. Improvements will be made to the interior design process for the health of people who are allergic to dust mites as suggested by the focus group meeting.

Results

Results show a pattern or process for healthy interior decoration for people who are allergic to dust mites.

A summary is made of the interview for creating a pattern or process for healthy interior decoration for people who are allergic to dust mites.

Table 1. Summary of the interview for the concept of creating a model or process for healthy interior decoration for people who are allergic to dust mites.

The idea of creating a form or process for healthy interior decoration for people who are allergic to dust mites	Ex1	Ex2	Ex3	Ex4	Ex5	Ex6	Ex7	Ex8	Ex9	Ex10	Ex11	Ex12	Ex13	Ex14	Ex15
1. Survey and Identify marketing information and related resources, analyze the interaction the time between people involved in the process, including other resources that can be touched (tangible) and cannot be touched (intangible), simulation of fictional users to	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓

The idea of creating a form or process for healthy interior decoration for people who are allergic to dust mites	Ex1	Ex2	Ex3	Ex4	Ex5	Ex6	Ex7	Ex8	Ex9	Ex10	Ex11	Ex12	Ex13	Ex14	Ex15
find information.															
2. Co-Creation is a joint creative process. Techniques and methods from relevant parties and other sources and establish service procedures under the support of sponsors that do not meet customers. Create a Service Blueprint that has been tested previously during the PHD process.			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Marketing Test is the creation of prototyping by putting the process into practical testing. Results are returned for analysis and improvement until it leads to a conclusion in business use.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
4. PHD Business Model Canvas plans marketing by starting with an overview of the business in PHD by analyzing the relevant parties. Strengths and weaknesses, impact and business benefits after taking the results of the PHD. Approach the business strategy in each phase of the business.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
5. Interior design and decoration process to meet the specific needs for health and respiratory allergies. Personalized Interior Health Design and Construction Process or PHD with eight processes.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. PHD process. The interior focuses on responding to individual needs. Personalize issues related to health care and respiratory allergies as well. There will be a decrease in the process of General Interior Design (GID).	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7. Additional details in the PHD process include searching for designers with experience in residential design and health-related designs.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The idea of creating a form or process for healthy interior decoration for people who are allergic to dust mites	Ex1	Ex2	Ex3	Ex4	Ex5	Ex6	Ex7	Ex8	Ex9	Ex10	Ex11	Ex12	Ex13	Ex14	Ex15
8. Additional details on the PHD process, including the designer and the owner of the apartment, must research and find information for the design. Other health and disease conditions to arrange a suitable environment.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9. Additional details in the PHD process include the selection of properties of materials that are safe from chemicals that do not affect health and the stimulation of disease symptoms. Requires expertise from experts in this field to provide information.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10. Additional details in the PHD process include the selection of floating furniture and home equipment. Must meet appropriate health standards.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

From the summary table of the interview, the idea is to create a pattern or a healthy interior design process for people who are allergic to dust mites, with details as follows:

1. Survey, identify, and search for marketing information and related resources. Analyze the interactions between people involved in the process, including both tangible and intangible resources through simulation or fictional users to gather information. Thirteen people agree on this issue while two people disagree on this point.

2. Co-Creation is the process of creating techniques and methods from relevant parties and other sources and establishing service procedures under the support of sponsors that do not meet customers to create a service blueprint that has been previously tested. In the PHD process, thirteen people agreed on this issue and two people disagreed.

3. The issue of a Marketing Test is to create prototyping and put the process into practical testing, then using the results for analysis and improvement in business. Thirteen people agreed on this issue while two people disagreed.

4. The issue of a PHD Business Model Canvas Marketing plan, starting with the overview of the business in PHD by analyzing the relevant parties' strengths and weaknesses, impacts and benefits. The results of the PHD business strategy approach show in each phase of the business, with thirteen people agreeing on this issue and two disagreeing.

5. Issues in the process of design and interior decoration to meet the specific requirements for health and respiratory allergies. Personalized Interior Health Design and Construction Process or PHD. There are eight processes, with thirteen people agreeing on this issue and two disagreeing on this point.

6. Issues for interior PHD processes that focus on individual needs. Personalize issues related to health care and respiratory allergies as well. Again, thirteen people agree on this issue while two disagree.

7. Additional issues in the PHD process include finding designers with experience in residential design and health-related designs. There are thirteen people who agree on this point and two who disagree.

8. Additional issues in the PHD process include the designer and the owner of the unit. Research is conducted to find information for environmental designs suitable for health and disease conditions. Thirteen people agree on this point, with two people disagreeing.

9. Additional issues in the PHD process include the selection of properties of materials that are safe from chemicals that affect health and the stimulation of disease symptoms. Expertise from experts in this field is required to provide the necessary information. Thirteen people agreeing while two disagree on this issue.

10. Additional issues in the PHD process include the selection of furniture and home equipment that is appropriate and meets the necessary health standards. Again, thirteen people agree on this point, while two people disagree.

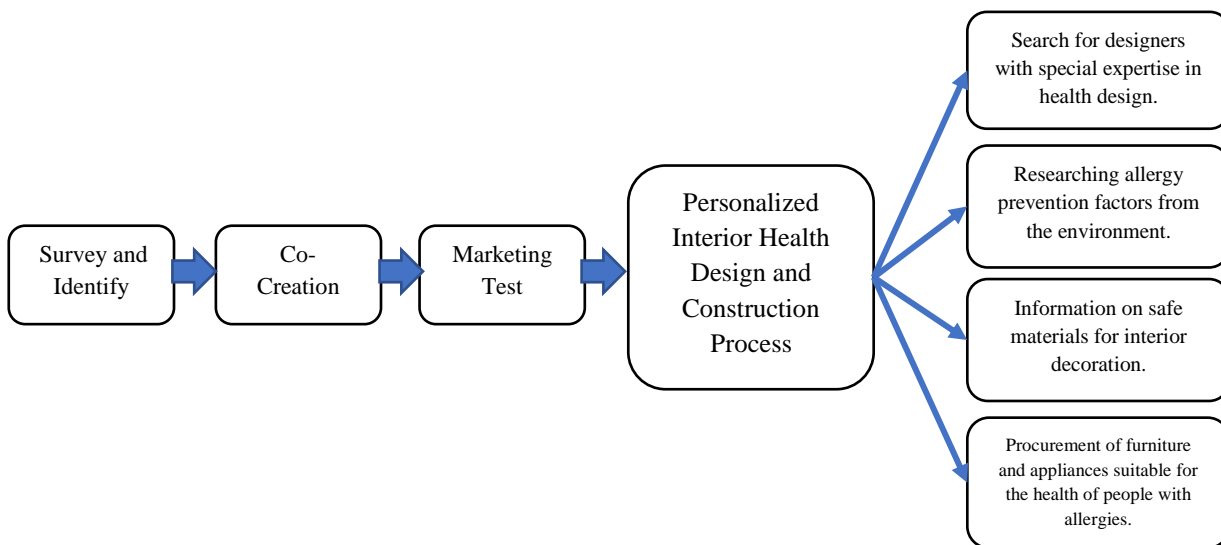


Figure 2 PHD process

Discussion

Service design planning should consider the connection and relationships of those in the service ecology. In the PHD process, there are the consumer unit owners with specific health needs, designers with experience in residential design, contractors selected by the owners, distributors, home appliances suppliers, and project developers.

The Service Blueprint PHD design begins with the introduction of the concept into the service design process to bring about new innovations that

are implemented, achieve acceptance, and can be utilized for value. Development of the internal system management process uses a database related to interior design, such as design information, materials, furniture, and materials for health and allergy reduction. The basic steps start with those who wish to decorate interiors for healthy living. An ability to communicate through the application or website creates and provides basic information, such as the condominium name, location, room type, floor, suite type, size, etc. After that, purchasers

choose the desired interior theme and can specify health orders specific to their needs, such as those for mothers and children, general health, allergies, etc. The designer will then design around contingencies for aesthetics and furniture placement, including determining benefits that match the information received and the specific needs of the residents, as well as determining the type of material that is suitable for the residents' health. Standards may be academically referenced, leading plan presentations and 3D images through computer modeling (Zhu & Zhang, (2010). Communication channels between those involved in the process support databases related to information linked to products and service providers with those in the supply chain, such as materials, products, subcontractors, manufacturers, distributors, carriers, testing institutes, and certification agencies. In addition, the owner can co-design and modify the materials and furniture with the designer. Most important of all is the ability to assess the price with the greatest accuracy as soon as the design is finished in order to be able to make decisions and manage budgets.

Innovation means new ideas and implementation using knowledge and creativity. New designs may be in the form of processes, products, or concepts, which can be used to benefit development of materials or products not yet commercially available. While many designs may not be suitable for practical use, some will inevitably make it to market, thereby expanding healthy options for designers and customers alike. These new developments will play a crucial role in helping people to improve their quality of home and work life. Health innovations are, therefore, critical in the development of promoting healthy lifestyle choices and disease prevention along with medical treatment and rehabilitation, when necessary (Andrew et al., 2010; Ministry of Public Health, 2017).

In the assessment of innovation, four aspects are considered: modernity, creativity, innovation in the management process, and the use of innovation.

1. Modernity reflects the continuous innovation or invention of new things. Innovations may be divided into levels, as follows: Individual, Department, Site, Company, Industry, Country, or the World. 2. Creativity, as based on the concept of Guilford, takes into account the response to needs and ease of use. 3. The management process concerns the readiness of personnel to produce and apply innovation to a budget that must be invested in that innovation. 4. The use of innovation reflects economic and social benefits by looking at the impact that can occur from the use of innovation in both quantity and quality (Jirapaet, 2015; Chesbrough, 2020).

Bringing new PHD processes to business management and administration in the service sector over the past ten years has created higher value, especially in the OECD (OECD, 2005), resulting in the value of the service economy increasing up to 70 percent of the gross national product (Maffei et al., 2005).

Service Design education is, therefore, an exciting topic. This research and its application in PHD consist of four phases of operation before entering commercial use, which are: 1. Survey and Identify - to survey and search for marketing information and related resources, then analyze the interaction time between people involved in the process and a simulation of fictional users. 2. Co-Creation is the process of creating techniques and methods from relevant parties and other sources and establishing service procedures under the support of sponsors that do not meet customers. The service blueprint has been tested previously during the PHD process (Polaine et al., 2013). 3. A Marketing Test is done to create prototyping and put the process into practical use. The results of the test are analyzed and improved until a conclusion for business use can be rendered. 4. The PHD Business Model Canvas plans marketing by starting with an overview of the business after analyzing the relevant parties. Strengths and weaknesses, business impacts and benefits provide the results of the PHD Approach

Business Strategy in each phase of the business (Osterwalder & Pigneur, 2010).

This research takes a look at the problems encountered and sees opportunities to create value in the current interior decoration process by synthesizing new work processes and creating knowledge management as they pertain to surveying the attitude of residents in the downtown Bangkok area regarding interior design as it affects health. The study focuses on the relationship between interior design materials and dust mite survivability and proliferation under different climate conditions. Interior designs for people who are allergic to dust mites in interior materials that do not adversely affect people with allergies are systematically sought. Processes can be applied to design and interior decoration for the health of allergy sufferers. Applied technology may be incorporated to modify methods that will reduce the process steps, thus saving time, reducing mistakes, and increasing efficiency in accessing health information materials. The results of the research will be applied to manage the interior decoration process and will be used at a suitable level, which will help create added value for businesses and will benefit research in this field in the future.

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