A Study of Innovative Design under the Trends of Future Lifestyle and Prospective Technology

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Abstract: This study investigates the prospective technological design to enhance the lifestyle quality. It explores the latest prospective technology through the "Interactive design and Situational analysis", learns development priorities and simulates future lifestyles. Furthermore, by "surveys of user's needs and interviews of industry experts", it analyzes the related products with breakthrough and marketability to understand the conditions of prospective design trends. Also, using the situational description method, it proposes the conceptual design under the future lifestyle trends and prospective technology. Complying results, the keys of future lifestyle trends combining with prospective technology are generalized as follows: (A) The health information management should be committed to the development of customized exclusive health detection device and the integrated platform. (B) The integration of travel information and its corresponding records should focus on the conversion of information and the virtual experience. (C) The established daily life network should improve the interaction, integration, instant feedback and recreation. (D) The changes in working pattern should be committed to the remoteness, cloud network, interaction, connection, automation and environmental protection. (E) The personal lifetime learning should be committed to interactive teaching with virtual characters, development of borderless learning environment, integration of learning data and records.

Key words: Innovative design, Future lifestyle, Interaction design, Prospective technology, Situational analysis

1. Introduction

1.1 Research background and motivation

Innovation of using knowledge is the key index of global competitiveness. So the innovative design combines with prospective technology to improve future lifestyle trends becomes the key for industry to go beyond the challenges and grow lastingly in the future. The common part of future R&D among advanced countries is humanism, and the main parts are four major areas of science and technology: environment, biomedical, information, and communication. So this study will start with humanism to investigate the use of prospective technological design to enhance the quality of lifestyle. It will also allow users to feel the convenience brought about by the technology and design of the new lifestyle in the future.

1.2 Research purpose

- (1) Investigate the newest trends of future lifestyle to understand the essential part of a new lifestyle situational design.
- (2) Understand the user's needs and the importance of development in the combination between future lifestyle and prospective technology by surveying user's needs.
- (3) Analyze the related products with breakthrough and marketability to understand the advantages and the conditions of prospective design trends.
- (4) Plan the prospective concept design by the trends of the combination of future lifestyle and prospective technology.
- (5) Use the situational description method to propose the conceptual design under the trends of future lifestyle and prospective technology.

2. Literature review

2.1 Future lifestyle

- (1) Rapid decline and aging in population: The world population exceeded 6.5 billion in 2005, and it will reach between 7.2 and 7.5 billion in 2015. But the population growth rate is rapidly declining in many countries. The world population growth rate was 1.7% in 1985, 1.3% in 2000, but it is expected only 1.0% in 2015 [5].
- (2) Globalization and knowledge society: The impact of globalization and the rise of the internet make it easier for people to work internationally and change the traditional working patterns. The enterprise organizational structure changes gradually and there are more and more virtual work teams which work distantly and internationally [1,2,3].
- (3) The trend of future work style: Tom Austin is the vice president of Gartner, an information technology research and advisory firm. He said the world of today is dramatically different from 20 years ago and the difference will be huger and with the lines between work and non-work already badly frayed. "Work will become less routine, characterized by increased volatility, hyperconnectedness, 'swarming' and more," said Tom Austin. He also said "Work Swams" and "De-routinization of Work" are two of the most important changes in the world of work [1,2,3].
- (4) Changes of the enterprises in the future: An enterprise' size will be no longer a main influence of competition in the future. The key to success is how to become an agile enterprise which uses diffused authority and flat organizational structure to speed up information flows among different departments, and develop close, trustbased relationships with their customers and suppliers [4].

2.2 Prospective technology

The essential part of the development of prospective technology is intelligence lifestyle. It means to combine the user's interface and interaction through by the IT infrastructure and the capability of systematic integration.

There are four trends of intelligence lifestyle generalized as follows:

(1) Intelligent interaction to meet the humanities: The intelligent household appliances helps people to live a healthier life. The computer technology will be everywhere in everyday life. The interactive space will break

the limit of 2D and achieve the real world of 3D. The user will have a whole new feeling about 3D by combining the 3D digital content and the real 3D displayer.

- (2) M2M -- the new revolution of internet: M2M will be the most important trend of industry in the next decade. Many countries including U.S., China, and Korea are upgrade the national industrial strategies for it. And it is predicted to become the key of world economy in 2020, and create a trillion U.S. dollars business opportunity. The chief applications of M2M includes green architecture, intelligent home, and intelligent grid. In pace with the development of societies, economy, technology, and related national policies all around the world, the intelligent living space will become a vehicle of technology mixed with innovation and lift a huge business opportunity [6].
- (3) Interactive service combining electronic device creates unlimited opportunity of business: The digital signage and the e-book are both the examples of interactive service combining electronic device. Interaction is the most important part of human-machine interface [5].
- (4) Cloud applications everywhere: When cloud computing is developing rapidly and environmental awareness is growing dramatically. Green cloud has became the main backing for the development of industry. By the research of the FIND (Foreseeing, Innovative, New, Digiservices), a research center of the Institute for Information Industry, 37% of the service industry in Taiwan has went for a service innovation, and their revenues have grown 33.3%. The revenues of the industries applying ICT to service innovation have even grown 52%. Both the rates mentioned above are higher than 4.4% -- the growth rate of those which have never dedicated in service innovation [6].

2.3 Summary

By collecting and organizing the related literature reviews mentioned above, this study generalizes the future trends as 5 issues as follows:

- (1) The health information management in the future: By the wearable health detection devices and the family health detection devices, we will get the data from laboratory in a cheap and convenient way. The data digitally records behavior, diet, activity, sign of life, and all the related information about the doctor's diagnosis. Therefore, it replaces the paper forms in a hospital and the handwriting note of a doctor in the past.
- (2) The integration of travel information in the future: There will be a service helping us to create the travel notes automatically. Furthermore, we can receive the comments and the information related to the real world by the screen of smart phones and other mobile devices.
- (3) The network construction of home life in the future: In future home life, the networks will be integrated. It will no longer use different networks to transfer different data, and all the data can be transfer through digital signals. In the future, the telephones and the cell phones will be the small size terminals connecting to the universal network to generalize all the electronic signals of a family. Moreover, the walls in a house will be large-scale multimedia interfaces interacting instinctively with the users by the principle of Natural Interface.
- (4) The transformation of working pattern in the future: In an office in the future, the need of web conferencing will continue to grow. It will become a paperless office by converting documents and other papers into digital form. A person can search and access the work-related information anytime and everywhere on a business trip. The workplace will be no boundaries, and it will decline the error rate and the leaking rate of data. Thus it provides the benefits of energy saving and cares about the trend of environmental protection.

(5) The individual lifelong learning in the future: The era of information integration will go into the stage of total recall. An user can make a customized personal learning progress by the open interactive information and the record-organizing function. Textbooks will transform into ebooks in the future. It can compute, communicate, and capture sounds and images automatically. It will also assemble the detection devices that detect health status, locations, etc. Furthermore, because of the R&D of the e-paper, we will have a soft and collapsable e-book which can be carried conveniently. The most curriculums will be e-lectures, and many book clubs will become online in the future.

3. Research method

3.1 Research framework and subjects

The two stages are adopted in this research. The first stage is to define the issues of the future lifestyle trends, where the documentary analysis is performed to extract the issue of the trend of the future lifestyle. The second stage is to investigate the user's requests in future life scenarios, and then to utilize KJ method to summarize and to analyze data so as to acquire the result. Participants in this research were young generation between 24-30 years old. The subject of the survey is defined as (1) The future trends for health information management, (2) The future trends for the integration of travel information and its corresponding records, (3) The future trends for establishing daily life network, (4) The future trends for the changes in working pattern, and (5) The future trends for personal lifetime learning.

3.2 Survey method

The research utilizes a semi-structured questionnaire in-depth interviews and surveys to investigate the user's needs to obtain the trend of the future life scenarios and user's requests.

Questionnaire is the main survey tool in this research. The content of the questionnaire is divided into six issues. The design of the first questionnaire utilizes the semantic differential method to investigate the intention of user's five sense experience. The survey method and item had been fixed through the interviews of industry experts and user's pre-test. The design of the second questionnaire has two stages in future need investigation. In the first stage, each category has 4 to 7 check box questions. The items include "yes" or "no". The second stage has 4 to 7 open-end questions.

3.3 Data analysis

To perform statistical analysis for the results of the questionnaire, statistical analysis for check box questions in first stage adopts Microsoft Excel for assistance, which utilizes descriptive statistics to obtain percentage icons for representing the strength on need in future. Open-end questions in the second stage adopt the KJ method for analysis, comparison and generalization. The groups according to their attributes are established. And then, the classified groups are analyzed to comprehend the future needs in each issue.

4. Results and discussions

In accordance with the options of the semi-structured questionnaire, the statistic of the data of 20 people for 5 subjects is performed. Also, the data is arranged in the order of importance such that the trend of the future need of the people can be analyzed.

4.1 Issue 1: The future trends for health information management

(1) Analysis for health information

From the statistics in Table 1, it is noted that the most of people manages health information in passive. People still has no habit for actively managing or recording the relative data or for periodical physical examination to survey the healthy status.

NO	Question		Y	Ν		
NO	Question	amount	percentage	amount	percentage	
A011	Do you have any habit for periodical physical examination?	8	40%	12	60%	
A012	Do you have any habit for managing and recording the health information?	4	20%	16	80%	
A014	Do you have any need for instant health information?	11	55%	9	45%	
A015	Do you have any need for a personal integrated platform of health information?	16	80%	4	20%	

Table 1. Statistics for the issue of health information

Through the KJ method analysis, it is noted that the most people starts to notice their healthy status when their symptom is obviously shown. And the method for dealing with symptom is to directly go to the hospital for medical treatment to view the health index thereof. The tendencies of need of the user in the future are pre-warning physical condition, automated recording, monitoring and sensing, and immediateness.

4.2 Issue 2: The future trends for the integration of travel information and its corresponding records

(1) Analysis for traveling experience

From the statistics in Table 2, it is noted that the most of people have the experience of unfamiliar areas or abroad regional tourism. And the most frequent even thereof is to get lost.

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No	Question		Y	Ν		
NO	Question	amount	percentage	amount	percentage	
B011	Do you have any experience of abroad regional tourism?	15	75%	5	25%	
B012	Do you have any traveling experience of unfamiliar area?	20	100%	0	0%	
B013	Do you have any experience of language barrier in tourism?	14	70%	6	30%	
B014	Do you have any experience to get lost in tourism?	17	85%	3	15%	

Through the KJ method analysis, it is noted that people is used to asking passers-by or searching the map to solve the issue of getting lost in tourism. When people are in tourism, local traveling data and capability in local language are required.

(2) Analysis for sharing the traveling experience

From the statistics in Table 3, it is noted that people want to share the most exciting part of the traveling experience in every traveling records to their friends.

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No	Question		Y	Ν		
INO	Question	amount	percentage	amount	percentage	
B031	Do you hope to share with friends of the selected highlight records in your every travel?	18	90%	2	10%	

Through the KJ method analysis, it is noted that the method for sharing the traveling experience is mainly in form of picture and film. The traveling records would be uploaded to internet to share. The user expects that the method for sharing the traveling experience includes integration, real-time, body sensing, and high-quality hardware devices.

4.3 Issue 3: The future trends for establishing daily life network

(1) Analysis for information integration and interaction

From the statistics in Table 4, it is noted that the most people expect that the information integration platform can integrate health information of family and household life information. Also, people expect interaction with appliances and living furniture.

No	Question		Y	Ν		
INO	Question	Amount	percentage	amount	percentage	
C012	Do you have requirement for interaction with appliances and living furniture?	14	70%	6	30%	
C014	Do you have requirement for integrating household life information?	14	70%	6	30%	
C015	Do you have requirement for family health information?	17	85%	3	15%	

Table 4. Statistics for the issue of information integration and interaction

Through the KJ method analysis, it is noted that people is used to utilize written note, such as bill information, to record the household life information. Users hope that the integration and interaction of information can be connected to the family health and the house living collection. They also expect the information can be integrated with the design ideas – kinesthetic operation, remote control, automatic integration and feedback, environment detection and adjustment.

4.4 Issue 4: The future trends for the changes in working pattern

(1) Analysis for work experience

From the statistics in Table 5, it is noted that half the people in this research have experience of meeting with foreign visitors and long-distance video conference. Such as, the scope of work has been advancing to internationalization.

No	Question		Y	Ν		
NU	Question	amount	percentage	amount	percentage	
D014	Do you have any experience of meeting with foreign visitors?	9	45%	11	55%	
D105	Do you have any experience of video conference?	8	40%	12	60%	

Table 5. Statistics for the issue of work experience

Through the KJ method analysis, it is noted that the trouble in work experience respectively includes poor time management, inconvenience in commuting and lodging and communication barrier in language. People expect that data process can be integrated into automated compile and record, convenience in data flow and the interaction of the operation interface, and so on.

(2) Analysis for data management

From the statistics in Table 6, it is noted that end users at this stage of processing electrical documents still has trouble on management in the aspect of data management.

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No	Question		Y	Ν		
NO	Question	amount	percentage	amount	percentage	
D022	Do you have trouble on management in electrical document?	14	70%	6	30%	
D023	Do you have trouble on management in E-mail?	9	45%	11	55%	

Through the KJ method analysis, it is noted that the trouble in data management includes lack of data link, difficulty in seeking data, data lost, time consumption in data management, and so on. People's expectation in data management includes digitalization, embodied interactive operation, automated filter, type conversion, connectivity, data transmission speed, and progress reminder, and so on.

4.5 Issue 5: The future trends for personal lifetime learning

(1) Analysis for learning experience

From the statistics in Table 7, it is noted that most people may imagine learning with talented people in various countries in future. In aspect of demand side, people want to know their learning portfolio.

No	Question		Y	Ν		
INO	Question	amount	percentage	amount	percentage	
E012	Do you have a demand for manipulating the learning progress and status?	15	75%	5	25%	
E013	Do you imagine learning with talented people in various countries in future?	17	85%	3	15%	

Table 7. Statistics for the issue of learning experience

Through the KJ method analysis, it is noted that the learning barrier in the learning experience includes oral difference, unable to immediately obtain the answer, unable to concentrate. People's expectation includes self-planning courses, multimedia interactive learning, instant record and memory recall.

(2) Analysis for learning record

From the statistics in Table 8, it is noted that taking course note is the common cognition of the current user in learning record. Most people have the habit in review, and have the attitude of lifetime learning. The difficulties are hard to search record data.

No	Question		Y	Ν		
INO	Question	amount	percentage	amount	percentage	
E021	Do you have a demand for recorded course notes?	20	100%	0	0%	
E023	Do you have habit for reviewing course note?	14	70%	6	30%	
E024	Do you have trouble in document filing and searching?	14	70%	6	30%	
E025	Do you have any idea in lifetime learning?	18	90%	2	10%	

Table 8. Statistics for the issue of learning record

Through the KJ method analysis, It is noted that the main users' learning records are electronic record, paper note, annotation, and recorded media. Users concern mostly the design for learning records with freedom, personality, diversity and convenience.

5. Verification on situational design

This study verifies the situation design by "Results and discussions" which are discussed above. It uses the situational analysis to conduct a description of design. When we design a situation, we need to understand the users' life backgrounds and motivations. Furthermore, we use situational imagination and specific conceptual idea to describe the future lifestyle. Therefore, designers can create products which are much more close to their concepts or imaginations by this study.

According to the results, this study develops the situational design to become a practical verification on the research results as shown:

5.1 Record and share immediately

While we travel in a foreign country or some unfamiliar region, we would like to capture people and things.

Table 9. Record and share immediately

Term	Description
What	While we travel in a foreign country or some unfamiliar region, we would like to capture people and things the new and interesting ones we just see in some media soon, and share with friends everywhere immediately. Thus they can enjoy the exotic experiences like they are right there.
Where	Foreign country / Scenic spot
When	2050
Who	Alice (Traveler)
How	Alice likes to travel abroad very much. She looks around excitedly when she gets off the plane, and she is curious about all the people and things. In order to share with friends and family everything she is seeing right now, she takes the fully automatic image-recording device from her backpack and put it on her both ears. The device projects a virtual window which captures all she is seeing. Alice waves her hand on top of the window to adjust its distant of view, and takes beautiful pictures. After taking a lot of pictures, she selects the photos and shares with friends and family. Then all her friends around the world receive the messages. They flip through the photos and show them in 3D images by the receiving devices at hand, and they feel as if they are there with Alice.
	 The method of image recording: The automatic image-recording device is like a lens in shape. It can be stuck to the glasses, trace the eyeball's movement, and record everything you see. Since it can be stuck to the glasses, taking pictures with a bulky camera is unnecessary, and breaking a camera carelessly will no longer be worried. It also can be used as a sunglasses to prevent from UV. The power will not be exhausted, because it can convert solar energy into electricity. The intelligent image-recording technology will automatically remove some unimportant images, so there is no problem of memory capacity.



Figure.1 Sample record and share immediately (PART 1)



Figure.1 Sample record and share immediately (PART2)

5.2 Digitalization of the meal ordering system

There is always a long queue of people waiting for ordering lunch in the employee restaurant everyday. The foods will be sold out if one joins late.

Term	Description
What	There is always a long queue of people waiting for ordering lunch in the employee restaurant everyday. The foods will be sold out if one joins late.
Where	employee restaurant
When	2040
Who	Dunhell (office worker)
How	Dunhell looks the time it's almost time to eat lunch! Dunhell uses the employee's ordering service device to see the images of gourmets and orders his favorite foods. He chooses the food he wants by the menu, and he can also learn about the related health information through the device (for example, the reduction of salt and oil, and the health indicators tables). Furthermore, he can use the device to watch the video of cooking during the time for waiting. When the time is up, it will remind him to get the meal. Dunhell gets his meal successfully and enjoys the delicious food. It's so timesaving and convenience.
	Food selection system in the central kitchen 1. We can choose what we want to eat by a touchscreen. 2. We can take meals right on time.



Figure.2 Digitalization of the meal ordering system

6. Conclusions

According to the results, the keys of future lifestyle combining with the prospective technology are generalized as follows:

- (1) The future trends for health information management should be committed to the development of customized exclusive health detection device and the integrated platform.
- (2) The future trends for the integration of travel information and its corresponding records should not only focus on the conversion of information and the virtual experience, but also develop motion-sensing operation and improve the hardware.
- (3) The future trends for establishing daily life network should improve the interaction, integration, instant feedback and recreation.
- (4) The future trends for the changes in working pattern should be committed to the remoteness, cloud network, interaction, connection, automation and environmental protection.

(5) The future trends for personal lifetime learning should be committed to interactive teaching with virtual characters, development of borderless learning environment, freedom in personal learning, integration of learning data and records and so on.

Through the results, we can learn that the extent of impacts are different to the users when the technologies are used in everyday life. In order to make the technological life more familiar to the users, this study proposes three suggestions as follows:

- Use the kinesthetic experiment to enhance the recreation and the friendliness in the interaction with technology. Therefore, the prospective technology can naturally integrate into the user's life.
- (2) Consider more about the user's emotional index, and reduce the negative emotion such as anxiety, trepidation and so on. Therefore, the prospective technology can be closer to the user's life.
- (3) Enhance the accuracy and the immediacy of communication in response to the extremely large amount of the computing of time management and information processing in the future with no boundary in time and space.

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