

Joint International Conference

# APCHI-ERGOFUTURE-PEI-IAIFI 2014

"With new mind set and widen horizon to catch the future: Physiology is the basic science for human life"  
UDAYANA UNIVERSITY, DENPASAR – BALI – INDONESIA  
OCTOBER 22-25, 2014



## Programme Book

# BALI 2014





# Programme Book

Joint International Conference  
**APCHI-ERGOFUTURE-PEI-IAIFI 2014**

"With new mind set and widen horizon to catch the future: Physiology is the basic science for human life"

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## WELCOME FROM CONFERENCE CHAIR



*Om Swastyastu,*

Based on long experiences working in Human Computer Interface (HCI), Ergonomics (Erg), physiology, occupational safety and health (OSH), up to now we are practically still running at the same place. Accident or occupational diseases in fact still happening, even in the workplace equipped with up to date regulation and personal protected devices. Unsafe acts and unsafe behavior must be managed to develop safety behavior. Mindset changes become an important issue to be success. To solve that problem. Balinese Branch of Indonesia Ergonomics Society supported by APCHI, PEI, IEA, IAIFI, Center of Ergonomics Study of Udayana University and Bali Human Ecology Study Group (BaliHESG) organize the Joint Internasional Conference APCHI-ERGOFUTURE-PEI-IAIFI 2014. The conference will be held at Udayana University at Jl. P.B Sudirman, Denpasar - Bali on 22 – 25 October 2014.

The goals are. 1. To provide guidance and direction for young ergonomists, 2. To show the unfit, improper, inappropriate research and application of ergonomics, physiology, computer interface, and OSH, 3. to convince that a total and a more strategic approach must be done in conducting research and application with aimto have maximum benefit.

The scientific program of APCHI-ERGOFUTURE-PEI-IAIFI 2014 including : 1) workshops and tutorials, 2). Keynotes address, 3) Free communication (parallel session) of various topics of physiology, human computer interface, ergonomy in small scale industries, children, women, cognitive ergonomy, MSDs, office, communities, agriculture, architecture, etc. and 4) Field Visit and Tour to Bali best tourism object (on request). To make the conference more successfully, the organizing committee invited overseasparticipants to participate in the conference. Bali is a paradise island with unique attraction culture shall becoming unforgettable experience to all participants.

*Om Shantih, Shantih, Shantih Om,*

**Conference Chair**

**Dr. Ir. Putu Gde Ery Suardana, M.Erg**

## GREETINGS AND BEST WISHES TO THIS CONFERENCE



Dear Hosts, Conference organizers, colleagues, and friends,

I would like to use this opportunity to express my congratulations to you for all your efforts and hard work to organize such an important event. Your dedication for promoting ergonomics discipline and profession as well as sharing and enlarging ergonomics knowledge has resulted in this well-organized conference with great contributions. I attended a previous APCHI-ErgoFuture Conference back to 2010, I was positively impressed with the work done by Indonesian scholars.

It is impressive to see how Indonesian researchers dedicate their work on solving local ergonomics needs while reaching out to the world. I truly support your efforts to apply ergonomics knowledge to the priority needs of the local and national community. I recognize clearly the great commitment of the organizers in continuing their efforts of hosting this conference again in four years short. It is equally important to satisfy local ergonomics needs and to network the international ergonomics community.

This conference hold in Bali, Indonesia, has served as an important platform for local and foreign participants to communicate, exchange knowledge and experience, as well as discuss and realize new ideas and mutual cooperation. It is an important event for the big ergonomics family, and is shaping the future development of ergonomics not only in this region but also globally. I hope our efforts could continue and make this conference in a regular basis, so the experience of the pioneers and their contributions could be carried over from generation to generation. Let this event be a place where we will regularly see old friends and meet new friends. Please accept my congratulations and best wishes to the success of our hosts' efforts and this conference!

**Eric Min-yang Wang**  
**President, International Ergonomics Association**



## CHANGING MIND SET AND WIDENING THE HORIZON TO ACHIEVE BETTER FUTURE



Recently we are facing various complex development problems which should be anticipated, - within our limitation -, in attaining our goals to enhance the quality of life and working life of the people at large. Impacts of Globalization, Global Warming, Eruption, Earthquake, 24 hours society, flooded area, drinking water shortage, are some of the problems we have to face and to anticipate.

And for a small island with all its limitation, likes Bali, in anticipating all those problems should be able to carry out a smart and wise development policy, likes to conduct "Development for Bali" and not "Development in Bali". There is no choice for Bali except to carry out sustainable development, using the three economic potentials: agriculture, tourism and small scale industry in synergist as means to attain the goals. To be different and winning the competition, cultural tourism must be utilized in developing tourism. Agriculture and Small scale industry should be able to show its consistency as the backbone of Bali's economy in crisis.

In all those activities ergonomists and ergonomics associations should be able to give their strong contribution and should be able to play a role as playmaker due to its position and strong role in human-machine-environment interface.

As the problems are so complex a Total Ergonomics Approach which consist of SHIP and Appropriate Technology approaches must be utilized. And to conduct such an approach, mind set change of the human resource must be developed. Holistic thinking and act must be empowered. Team approach must be conditioned. Egoism and arrogant attitude must be thrown away.

And through ergo future 2006, 2010 and 2014, we try to aware the problems, to empower the human resource and to enhance the capability of tools to support. Therefore we have to thank everybody who have already given their concerned and commitment to this efforts by supporting the conferences in various means.

We shall not stop the efforts only by organizing conferences, but beyond that. Fundamental efforts have been planted and time to grow it together by academician, government and people at large, has already come.

Finally welcome to all participants in the conferences and let us make a jump in our endeavor to enhance the quality of life and working life of the people.

Please enjoy your visit scientifically and culturally. Thank you.

**Prof Emeritus Adnyana Manuaba**  
**Initiator Ergofuture**

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# Incorporating customer emotional needs using Kansei Engineering and Kano model to support Customer Relationship Management: A case study in healthcare services

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**ABSTRACT:** With regard to customer focus and orientation, nowadays, a company or product/service provider should be more concerned on how to fulfill customer emotional needs as a main complement to cognitive needs. To support a long term relationship with customers, recent research shows that understanding customer emotional needs (Kansei in Japanese) is a vital ingredient for customer relationship management (CRM). Thus, this study proposes an integrative framework of Kansei Engineering and Kano model to support CRM in services. Services is chosen as it is the most recent significant industrial sector in today's business economy. To verify the applicability of the proposed integrative model and framework, a study in healthcare services was conducted. A hundred of actual patients were surveyed and involved in the study. The findings show that some SERVQUAL attributes which were sensitive to customer emotions and attractive to customer satisfaction were identified and formulized. Some initiatives such as on time raw material selection, employee training, one stop service and standardized services were discussed and proposed as prioritized continuous improvement. Practical and theoretical implications will be discussed in this study.

**Keywords:** customer emotional needs, Kansei, customer emotional needs, Kano model, Kansei Engineering

## 1 INTRODUCTION

Human factors or Ergonomics deals with something related to human capabilities and limitations. A product or service should be designed according to the human factors principles. This is due to human role either as a user, designer or customer. Apart from physical aspects of human factors, a product or service should be designed or modified incorporating emotional aspects. In Japanese, it is called Kansei (Nagamachi, 1995; Hartono and Tan, 2011).

A method that manipulates customer emotional needs/Kansei extensively and translates them into product or service is called Kansei Engineering. Hence, product or service should engage properties and features which can make them distinguishable, unique and attractive to customers. Pricing and quality is no longer sufficient as a critical factor to exist.

Not only in product design and development, the research on Kansei Engineering has been starting to expand into services and business. More specifically, more attention should be made on how to retain the existing customers. Kansei Engineering tries to

show its superiority in developing a methodology about how to model and fulfil customer emotional needs.

The main concern of human factors on business-oriented application is not only to achieve customer satisfaction, but also how to obtain customer retention. Nowadays, it is called Customer Relationship Management, or in short it is popular known as CRM. To understand customer emotional needs is vital for predicting and influencing customer purchasing behavior (Tehrani, 2002). In other words, how to show human as the main and vital component in business interaction and experience is a must. Human needs to be humanized.

With respect to the lack of customer focus on emotional needs during CRM implementation, an integrative approach for achieving service excellence is needed. An initiative research that discusses Kansei Engineering combined with SERVQUAL and Kano model, an integrative Kansei Engineering and CRM, and Kansei Engineering with QFD have been conducted individually (see Hartono and Tan, 2011; Hartono and Meitha, 2013, Hartono et al., 2013). This research will discuss how the Kano model and Kansei Engineering contribute to CRM program



through the development of integrative conceptual framework to achieve more service excellence.

This paper is organized as follows. Following the introduction, there will be a short review on Kansei Engineering and the Kano model. Thereafter, a research methodology followed by a case study on healthcare services. A discussion and conclusion parts will wrap up the entire article.

## 2 LITERATURE REVIEW

### 2.1 Human factors/Ergonomics in services

Similar to products, a service needs human interaction and experience. It is a human-oriented activity where humans play the roles as the provider and customer/user. The centrality of human in both human factors/ergonomics and service science forms the basic link to further explore the possible area of intersection between them. Inherently, human factors/Ergonomics has a concern with human well-being applied to both the customer and the employee (Hartono and Meitha, 2013).

### 2.2 Kansei and Kansei Engineering

Kansei refers to emotional feelings and emotions. A popular method to accommodate Kansei is known as Kansei Engineering. KE has been launched since 1970s by Professor Mitsuo Nagamachi from Hiroshima University. KE has been defined as an ergonomic-based technology method with a focus on customer-oriented product development taking into account the customer emotional needs and feelings (Nagamachi, 1995). This powerful emotions-oriented approach is able to deal with both attractive exterior appearances and properties which are not directly detectable or visible such as the atmosphere of a concert hall, the concepts of good driver feeling or quality feeling by modifying the engineering properties of the products (Schütte et al., 2008). For more description about KE, please refer to Nagamachi (1995).

Comparing to other similar methods which is involving customer emotions and feelings, KE is deemed to be superior (Hartono et al., 2013). KE is able to provide a mathematical model. Kansei is deemed to be response, while external stimuli with a set form of service attributes or product elements is defined as independent variables. Taking into recent development of integrated tools and methods, KE is capable of integrating its methodology with other service or product quality tools. Most relevant and common tool is Quality Function Deployment and the Kano model (see Hartono and Tan, 2011). In addition, KE utilizes statistical engineering in the use of service tools (Nagamachi and Lokman, 2011). More importantly, in short, KE has a strong ability to capture today's customer trends such as hedonistic, pleasure and self-centric mechanism (Helander

and Khalid, 2006). This is where customers tend to expect and put their attention more on emotional impressions rather than merely on technical quality and usability (Nagamachi, 1995).

### 2.3 The Kano model and CRM with Kansei Engineering

The Kano model will categorize service attributes into 3 main different performance, namely, (i) Must-be/basic, (ii) One-dimensional, and (iii) Attractive/delighter. Related to Kansei, the last two Kano categories (i.e., One-dimensional & Attractive) are deemed to be sensitive. A one-dimensional (O) attribute the better the performance, the higher the level of customer satisfaction is. While the attractive (A) attribute, known as delighter, is beyond customer expectation. A little fulfilment on it brings a great deal of satisfaction (see Hartono and Tan, 2011).

With regard to CRM, the focus of this study is on relationship program. It is more of a technique for implementing CRM. The overall goal is to deliver a high level of customer satisfaction and delight. Since most of failures of CRM programs is due to lack of people-oriented needs (Stringfellow et al., 2004), thus the understanding of customer emotions or Kansei will enhance the critical role of CRM programs.

## 3 FRAMEWORK DEVELOPMENT, RESEARCH METHODOLOGY AND EMPIRICAL STUDY

Several studies about how to engage customer emotional needs/Kansei in services have been conducted and published (Hartono and Meitha, 2013). It is, however, not meant that all studies are completely done. Due to cultural issues and different service contexts, some modifications on service research are still of high potential.

To understand the relationship of KE and the Kano model considering CRM programs, this research proposes an integrative application model framework (see Figure 1), followed by an empirical study on healthcare services.

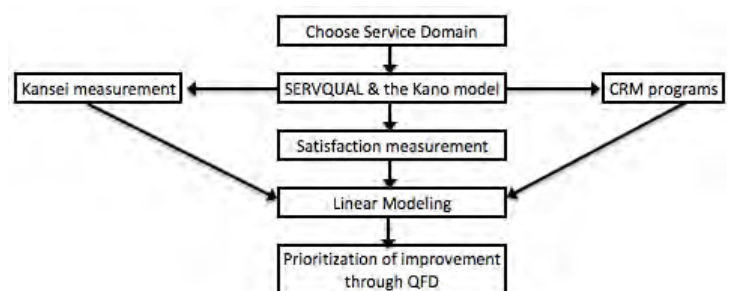


Figure 1. General integrative conceptual framework of Kansei Engineering, the Kano model & CRM

According to what is shown in Figure 1, after choosing a particular service, Kansei measurement consists of importance and response level will be conducted. Concurrently, the use of SERVQUAL model and the Kano model will take place to provide the main stimuli for customer emotional needs. Then, CRM program as the external stimuli will be added. To see which of service attributes have low impact and yet important (i.e., due to either One-dimensional or Attractive Kano category), satisfaction measurement will be provided. Afterwards, mathematical modeling using multiple linear regression will take place, and then followed by prioritized improvement initiatives through Quality Function Deployment/QFD phase I (or it is known as House of Quality/HoQ).

Personal interviewing and face-to-face questionnaire were utilized to collect data. The face-to-face questionnaire will allow clarification on complex and ambiguous questions, problem verification and spontaneity of participant. The effectiveness of use of this method has been shown in the previous studies (see Hartono and Tan, 2011; Hartono and Meitha, 2013).

A case study on healthcare services in Surabaya was conducted. There were 102 respondents involved (51 females and 51 males) with the age range of 21 – 40 years old who have experienced healthcare services in the last 2 years (i.e., 2012-2013). The distribution of healthcare was A-class (33.33%), B-class (33.33%) and C-class (33.33%). A unified questionnaire that consists of 3 different survey questions (SERVQUAL, Kansei and CRM) was used and distributed. All variables were deemed valid and reliable after passing through validity and reliability tests using confirmatory factor analysis (CFA).

#### 4 RESULT AND DISCUSSION

Using interview and survey, all participants were asked about their experiences of healthcare. Kansei expectation and perception (responses) was shown in Table 1 below.

Table 1. Kansei expectation and response

Kansei word	Expectation		Perception	
	Mean	St. Dev.	Mean	St. Dev.
Happiness	4.19	0.67	3.79	0.81
Friendliness	4.43	0.58	3.95	0.7
Comfort	4.21	0.75	3.87	0.8
Satisfaction	4.12	0.79	3.87	0.81
Belief	4.1	0.72	3.83	0.89
Endurance	4.05	0.86	3.6	0.98
Quietness	4.14	0.81	3.53	0.97
Spaciousness	3.95	0.81	3.68	1.04
Arrangement	4.23	0.74	3.62	0.93
Boredom	4.13	0.75	3.43	1.06

According to what is shown in Table 1, the highest and most important Kansei experiencing healthcare services was about friendliness. It had the highest expectation and perception. Based on in-depth interview with respondents through preliminary study, a person who was staying in a hospital demands a very friendly staffs (including doctor, nurse and employee), a “feeling like home” situation.

A mathematical modeling using multiple linear regression was done. Through a-5 point Likert scale, the perception score of Kansei word was set to be dependent variable, while the perception of service attribute(s) with negative satisfaction score and One-dimensional or Attractive Kano category, and also the negative perception score of CRM program were set to be independent variable. The models are shown in Tables 2.

Table 2. Linear model of Kansei & service attributes

No	Kansei word	p-value	R <sup>2</sup>	Linear model	Significant service attribute(s)
1	Happiness	0.000	0.189	Happiness = 1.528 - 0.300 RL5 + 0.309 E2 - 0.275 TH1 + 0.252 TH3	Variative and fresh food menu (RL5) Nurse, doctor and staff always give special attention and greeting to patients (E2) Ease of communication among patient, nurse, doctor and staff (TH1) Complain and suggestion are promptly handled (TH3)
2	Friendliness				N/A
3	Comfort				N/A
4	Satisfaction	0.007	0.070	Satisfaction = 2.367 + 0.346 T5	Facilities at healthcare are complete, comfortable and clean (T5)
5	Belief				N/A
6	Endurance	0.022	0.052	Endurance = 4.735 - 0.290 RL5	Variative and fresh food menu (RL5)
7	Quietness	0.007	0.094	Quietness = 0.772 + 0.416 RL6 - 0.271 TH3	Procedures of service and payment are easy and simple (RL6) Complain and suggestion are promptly handled (TH3)
8	Spaciousness	0.021	0.052	Spaciousness = 2.329 - 0.334 L1	You will recommend this healthcare to your relatives or colleagues (L1)
9	Arrangement				N/A
10	Boredom				N/A

With respect to each of significant service attributes, Kano category and the number of affected Kansei words, a formulized critical service attribute(s) and CRM program(s) was arranged using HoQ (see Table 3).

Table 3. Prioritized improvement initiatives

No	Service attributes	[Satisfaction score]	Kano weight	Kansei word & its mean	Importance of what(**)
1	Facilities at healthcare are complete, comfortable and clean (T5)	1.41	A	4 Satisfied 3.87	21.87
2	Nurse, doctor and staff always give special attention and greeting to patients (E2)	1.65	A	4 Happy 3.79	25.05
3	The skill of nurse, doctor and staff to serve you (RL2)	2.11	A	4 -	8.44
4	Variative and fresh food menu (RL5)	2.64	A	4 Happy 3.79 Endure 3.6	78.1
5	Procedures of service and payment are easy and simple (RL6)	2.19	O	2 Quiet 3.53	15.47
6	Nurse, doctor and staff are always in time of need (RP2)	2.52	O	2 -	5.04
No	CRM programs	[CRM score]	Kano weight	Kansei word & its mean	Importance of what(**)
7	Patient can find any information easily (TH2)	0.46		-	0.46
8	Complain and suggestion are promptly handled (TH3)	0.49		Happy 3.79 Quiet 3.53	3.59
9	You will build longterm relationship with the healthcare (L1)	0.36		Spacious 3.68	1.33

Notes:  
Importance of What for significant Kansei:  
(\*) Importance of what = [Satisfaction score] x Kano weight x (Sum of Kansei mean score)  
(\*\*) Importance of what = [CRM score] x (Sum of Kansei mean score)

Importance of What for insignificant Kansei:  
(\*) Importance of what = [Satisfaction score] x Kano weight  
(\*\*) Importance of what = [CRM score]

According to the findings, in general, it seems that the Kansei “Happiness” was regarded to be the dom-



inant emotional impression during the healthcare service interaction and experience. It is due to special attention given by all staffs in the healthcare (including doctors, nurses and staffs) and also prompt service for any complaint and suggestion.

With respect to weighing process accomodating the Kano weight, satisfaction score and the number of affected significant Kansei word(s), the 3 main critical attractive service attributes to be taken into account were summarized. They include various and fresh food menu (1<sup>st</sup> priority); nurse, doctor and staff always give special attention and greeting to patients (2<sup>nd</sup> priority) and facilities at healthcare are complete, comfortable and clean (3<sup>rd</sup> priority). Thus, to capture and fulfil what the customer needs in healthcare services, a manager should focus on providing various and fresh food menu. While, the quality of other intangible components such as friendly doctor, nurse and staff is of high important as well. Concurrently, tangible aspects tend to be generally important. They include basic facilities such as clean toilet, bed and other physical stuffs in the room.

## 5 CONCLUSION & FUTURE RESEARCH DIRECTION

With a case study on healthcare services, an integrative framework of Kansei Engineering taking into account the Kano model and CRM has been tested. The findings showed that in healthcare services, apart from tangible aspects, there is a critical need for providing excellent intangible aspects such as prompt and friendly services, special attention to patients, and how to serve foods fresh and diversified. Human needs to be humanized.

For future research, it is of high potential to embark such similar study in different service settings. A new approach of analysis using more comprehensive statistical tools is also something to take into account.

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