Croatian Ergonomics Society

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OF THE

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EMPHASIS ON WELLBEING

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ERGONOMICS 2018 – Emphasis on Wellbeing

The Conference is organized by:

CROATIAN ERGONOMICS SOCIETY

The Conference is endorsed by:

Conference Endorsed by the IEA International Ergonomics Association

Endorsed by FEES Federation of European Ergonomist Societies

Hrvatsko akustičko društvo HAD Acoustical Society of Croatia

The Conference is co-organized by:

FSB University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture

University of Zagreb, Faculty of Textile Technology

University of Zagreb, Faculty of Transport and Traffic Sciences

E.S.T Ergonomics Society of Taiwan

HKES The Hong Kong Ergonomics Society 香港人類工效學學會

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7th International Ergonomics Conference

ERGONOMICS 2018 – Emphasis on Wellbeing

The Conference is organized under the auspices of:

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Preface to the Conference Proceedings

The 7th International Ergonomics Conference - *ERGONOMICS 2018 – Emphasis on Wellbeing* was held in ZADAR, from June 13-16, 2018. Zadar is one of the most beautiful towns on the Adriatic coast, surrounded by historical ramparts, an old town monument and treasury of the archaeological wealth, elected in 2016 the EUROPEAN BEST DESTINATION.

The Conference topic *Emphasis on Wellbeing* highlights the importance of individual wellbeing at and outside the workplace, in accordance with many series of recent studies which have been focused on the establishment of wellbeing. Wellbeing has traditionally been the topic of numerous philosophical studies, but only in recent decades, it has become an important matter in numerous different and multidisciplinary fields.

The Conferences in this series have been organized by the Croatian Ergonomics Society (CES) from 2001 as part of CES objectives to promote ergonomics and exchange knowledge and experience with the scientific and professional community from Croatia and the world. The Conference *ERGONOMICS 2018 – Emphasis on Wellbeing* is a great opportunity for all our participants and all stakeholders to contribute to a valuable exchange of knowledge and experience, to encourage stronger interconnections between science and business, as well as a great way to open up new possibilities, meet old and make new friends, and contribute to advances in ergonomics in Croatia once again.

This time, the Conference *ERGONOMICS 2018 – Emphasis on Wellbeing* is a joint project with our co-organizing partners:

- EST (Ergonomics Society of Taiwan),
- CES (Chinese Ergonomics Society),
- HKES (Hong Kong Ergonomics Society),
- Russian IREA (Russian Inter-regional Ergonomics Association),
- FPZ (Faculty of Transport and Traffic Sciences), University of Zagreb,
- FSB (Faculty of Mechanical Engineering and Naval Architecture), University of Zagreb,
- TTF (Faculty of Textile Technology), University of Zagreb

Furthermore, Conference has been this time endorsed by:

- IEA (International Ergonomics Association),
- FEES (Federation of European Ergonomics Societies).
- ASC (Acoustical Society of Croatia)

The Conference program this time included oral and poster presentations of papers from the following GROUPS OF TOPICS:

- Aesthetics and Ergonomics
- Biomechanics and Modelling in Ergonomics
- Cognitive Ergonomics
- Education and Trainings in Work Safety and Ergonomics
- Ergonomics for People with Disabilities and Aging Population

- Ergonomics in Product and Process Design
- Ergonomic Regulations, Standards and Guidelines
- Healthcare Ergonomics
- Physical Ergonomics and Human Factors
- Human Comfort
- Safety and Risk Ergonomics
- Psychoacoustic Ergonomics
- Social and Occupational Ergonomics
- Traffic and Transport Ergonomics

The Organizing Committee (OC) of *ERGONOMICS 2018 – Emphasis on Wellbeing* received more than 80 contributions within diverse range of conference topics, from which only full texts of all reviewed and accepted papers were published in the Book of Proceedings with ISSN 1848-9699 (print) and ISSN 2584-5012 (USB), regardless of what type of presentation has been chosen (oral presentation or paper presentation). We are in the first stage of the Scopus submission process at the moment of publishing and we hope that the Book of Proceedings will be indexed in the Scopus base in the near future in order to ensure public availability of the published papers to a wide academic community. All submissions are peer-reviewed by the International Scientific Committee and referees from abroad and Croatia.

Besides, the connection with IEA and FEES has been improved, and it should be noted that CREE-IEA-FEES workshop as part of the Conference program for all the interested Conference participants was the beginning of the official cooperation between CES and CREE.

Finally, the Conference provided a good opportunity for new contacts, new experiences and new friendships.

I am pleased to note that the successful Conference is an outcome of the work of a large group of people. We would like to express deep appreciation to all co-organizing partners, patrons and sponsors, who enabled and helped to make this Conference successful. We also acknowledge the authors themselves, who contributed to the Conference success with their expertise, appreciating authors´ willingness to devote their time for writing the papers and conducting the studies. Finally, with special respect, I would like to thank sincerely all the reviewers and all the members of all the Conference bodies from Croatia and from the world for their devoted work usually in their leisure time which was in the last part of their tasks under huge time pressure, as well as their families or partners for their patience during the preparation of the Conference in the few past months.

I believe that CES with the help of international partners will be able to keep up this level of performance in the future because of the involvement of several young colleagues from Croatia in the Conference organization, for which I am very happy and grateful.

Asst. Prof. Davor Sumpor, PhD
President of the Croatian Ergonomics Society
General Chair and President of the Organizing Committee

History of the International Ergonomics Conference

The Croatian Society of Ergonomics was established at the founding assembly on 20 May 1974 in Zagreb. The founder and the first president was professor emeritus Dragutin Taboršak. In the year 1991, the Croatian Society of Ergonomics changed its name into Croatian Ergonomics Society (CES). CES has taken care of scientific, professional and educational fields of ergonomic in the Republic of Croatia, as well as promoted cooperation with the business community. CES has been interconnected with relevant societies and organizations in the field of ergonomics worldwide to sustain the scientific and professional level.

In 2014, the Croatian Ergonomics Society celebrated its 40th anniversary. This was an excellent opportunity to present the current research and professional activities and contribution of the CES members to the development and promotion of ergonomics, the Croatian civil society and beyond.

Throughout the history of our CES, numerous activities of our members have contributed to our existence and affirmation in the broader society, and this has been converted into our liability to continue and promote ergonomics based on that foundation. Therefore, the activities of CES members as well as CES working bodies arise from our main objectives and strategies that were improved in a few last years and may be presented in short as follows:

1. Increasing the number of active and regular members in Croatia;
2. Providing a membership of prominent scientific and professional experts within the field of ergonomics from abroad in CES;
3. Organizing lectures, discussions and exchanging of experiences for the members of CES;
4. Continuing with activities of introducing the subject of ergonomics into the educational system in Croatia;
5. Organizing and implementing university study programs of ergonomics at undergraduate, graduate and doctoral levels in Croatia;
6. Promoting implementation of ergonomics into professional practice in Croatia;
7. Supervising and improving professional work within the field of ergonomics in Croatia as well as starting active co-operation with CREE (Centre for Registration of European Ergonomists);
8. Organizing conferences within the field of ergonomics in Croatia;
9. Co-organizing, supporting and endorsing all conferences in Croatia which contain groups of topics from the field of ergonomics;
10. Organizing and co-organizing popular seminars for the extension of ergonomics in Croatia;
11. Associating and affiliating with other similar and related societies from Croatia and the world;
12. Co-organizing and attending the related ergonomic conferences of all ergonomics societies in Europe and the world that officially and really support the work of CES;
13. Encouraging research work within the field of ergonomics in Croatia;
14. Active participation in the work of umbrella ergonomic associations in Europe and the world, such as FEES and IEA

Therefore, based on the enumerated CES objectives, and identified in the early days of the CES existence, our most prominent and most important action is to organize and co-organize conferences within the field of ergonomics, as well as to establish connections with other complementary Societies and individuals from Croatia and the world. In December 1999 the Congress marking the 25th anniversary of the Society was held in Zagreb, and based on the acquired conclusion, the most appreciated activity in promoting the Society existence and mission was identified as the organization of the International Ergonomics Conferences. Since then, CES successfully organized six International Conferences, listed consecutively:

- 1st International Ergonomics Conference – Ergonomics 2001, Zagreb,
- 2nd International Ergonomics Conference – Ergonomics 2004, Stubičke Toplice, Zagreb,
- 3rd International Ergonomics Conference – Ergonomics 2007, Stubičke Toplice, Zagreb,
- 4th International Ergonomics Conference – Ergonomics 2010, Stubičke Toplice, Zagreb,
- 5th International Ergonomics Conference – Ergonomics 2013, Zadar.
- 6th International Ergonomics Conference – Ergonomics 2016 – Focus on Synergy, Zadar.

The International Ergonomics Conference in Croatia has been founded and created by prof. Budimir Mijović, who was also the president of the Organizing committees of Conferences until 2013.

In the future, we expect that our vision and mission will be improved through the additional actions in order to affirm and promote ergonomics in Croatia.

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7th International Ergonomics Conference
ERGONOMICS 2018 – Emphasis on Wellbeing
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Research model in Ergonomic for Product design process in Behavioural Manipulation

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Abstract

Product design as an object is able to give command how to use through its interface form. Such interfaces sometimes give no choice but to obey the way to use the product, especially those who has different segmentation background, the product design could force someone to do something according to how it works. Most of the design process already engage the evaluation process from user experience and refine it into better and suitable design. A good design could not only focus on economic purpose especially for user satisfaction, because not all of the customer has the awareness of the other aspect that may effect their behaviour in daily life. A good design product could be a way to manipulate user behaviour to maintain a good behaviour according to the particular group or community norms and value as a segmentation. This paper aims to offer a model to consider some aspect in design process by adapting from SAD to CHEER model.

Keywords*: Behavioural Design, Product design, Good design, from SAD to CHEER*

1. INTRODUCTION

Product design has been a part of human life. Since the last few decades there is so many motive behind the product design itself, and the most basic motive of product design is to fulfil human needs, but in the changes of time, the product that use to create for its function, changes into something related to its own century.
One of few many product design is daily product design. It evolve from the product which is focus in function, than the design focus for the user friendly, fun and so on. Lin explains the evolution of design products known as 5F,"These five F's are: (1) 1930's -design for 'Function', (2) 1950's -design for 'Friendly', (3) 1970's -design for 'Fun', (4) 1990's -design for 'Fancy', and (5) 2000's -design for 'Feeling' [9]..
When the design tend to chase the trend of the user feeling, the awareness of designer responsibility is challenged, it's because not all of the user has the awareness of the effect of their own satisfaction. Sometimes the tend of industrial product focus on the user satisfactory which is lead to the reckless behaviour of the user.

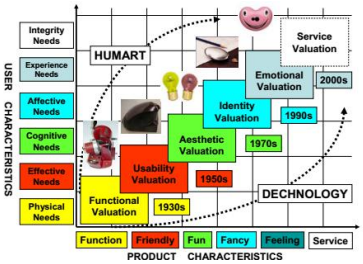

Figure 1: The evolution of product (Lin, 2007)

Design should not always be done solely for the sake of the industry solely oriented to the satisfaction of users to gain economic benefits. This studies argue that product design should not only focus on commercial purpose only, but also trough product design, designer could participate in the process of creating better society, by manipulating user interface of particular product design to affect user behaviour. Papirous also said the similar thing in the field of graphic design, in an interview about visual communication design said "Science of visual communication design is not just design to fulfil the needs of the industry. But able to make a lonely city into a shining city."[15].

Addition to that, Designers always seek to expand their roles. Theories like human-centered design focus on physical needs of and the tasks they perform with products, another human focused design approach emerged out of an interest in how products were formed in the first place - the cultural implications and meaning of product and their form.

In the field of Design for Sustainability, as in all fields of design, Ergonomics represents an innovation factor of the design culture that provides the designer with the necessary knowledge about human characteristics and capabilities, and the methodological tools for evaluating different people-needs during use and interaction with the products at work and in everyday life. [17]

Beside cognitive aspects of product design the emotional aspects is also to be considered, as suggested by Norman, Emotion result from three different levels of the brain: visceral; behavioural; reflective. Each plays a different role in the total functioning of people. Visceral design accommodates Appearance, Behavioural design accommodates The pleasure and effectiveness of use, and Reflective design accommodates Self-image, personal satisfaction, memories [4]

To get a better understanding of the studies, the research will adapt the existence model, so the new model would be a model based on previous model with specific context. To break down the research model for product design motive, the method should distinguish by its motive. One of the method of cross cultural communication is conduct by Rt Lin as shown in the figure bellow

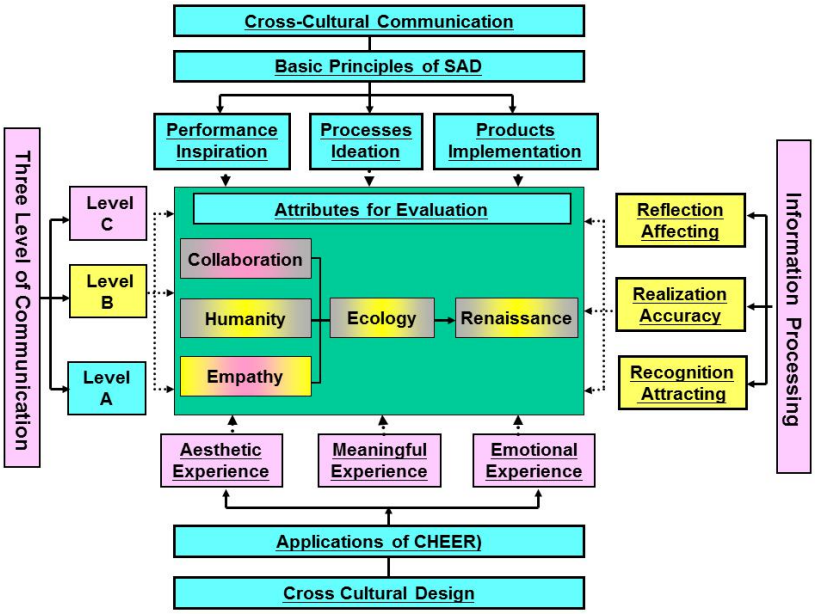

Fig. 1 Cross-cultural Communication in Design Collaboration: From SAD to CHEER. In International Conference on Cross-Cultural Design. Springer, Cham. (to be publish in 2018)

The figure attempt to bridge cross cultural communication, basic principle of SAD (Science, Art, and Design) divide into 3 part of inspiration, ideation, and implementation with attributes for evaluation CHEER (Collaboration, Humanity, Empathy, Ecology, and Renaissance) with 3 level of communication. The studies will begin by apply "From SAD to CHEER" method to find research model for product design process.

2. RESEARCH FRAMEWORK

The model "from SAD to CHEER" explain about 3 level of communication, design process, audience response, and also product impact. The attempt to adapt this method to distinguish product design process, the model will be adjust in the context of product design. Product design process always affect by the cultural background of particular segmentation. "Culture" plays an important role in the design field, "and cross cultural design" will be a key design evaluation point in the future. Designing "culture" into modern product will be a design trend in the global market [11]. This studies context of culture as a key of design evaluation would be define as a motive of designing product. There is various motive behind the product design, the motive can be distinguish into two kind, for economical purpose such as commercial product and social purpose as a form of design for society.

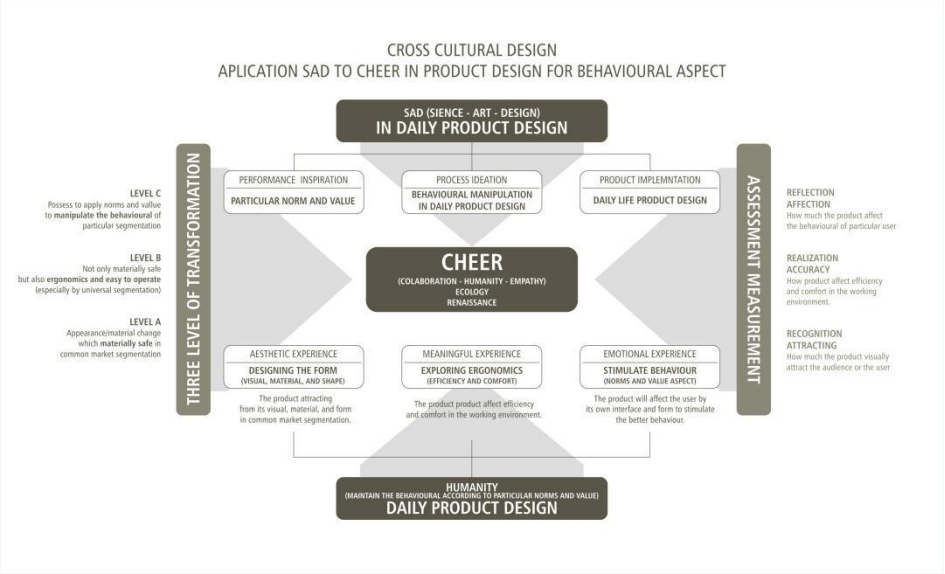

Fig. 2 model "From SAD to CHEER" applied in product design process

The Breakdown of design process of SAD; 1.Performance Inspiration (related to the design purpose as the inspiration), 2.Process Ideation (bridging the design purpose and implementation), 3.Product Implementation (implement the idea into daily product design) and product implementation as application of CHEER; 1.Aesthetic Experience (the product attract for business purpose), 2.Meaningful Experience (the product affect the efficiency of workplace), 3.Emotional Experience (elaborate norms and value for advance purpose of product design).
The other part of the model which originally discuss about three level of communication and processing information would be use as the level of product design process which is distinguish by the design purpose. The information process part would be the way to assess each level.

3. METHODOLOGY

The research based on SAD to CHEER model to break down the product design motive into three level. The method to applying from SAD to CHEER model for product design motive from the basic motive into advance motive. There is stage of product design process and all of the process start from Performance/ inspiration as a motive of product design start to the first level of design process which is; 1. Aesthetic experience, which is focus on designing form for basic/ business purpose. 2. Meaningful Experience, which is exploring the ergonomics and efficiency in workplace. 3. Emotional Experience, which is focus the user interface manipulation to stimulate particular user behaviour.

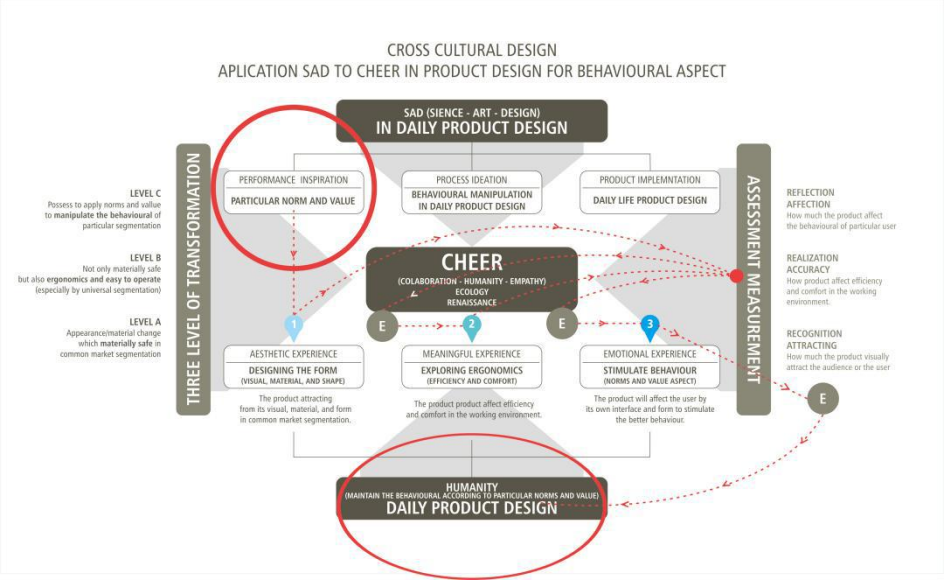

Fig. 3 Research work flow for traditional board game

The level of research method for product design studies using SAD to CHEER will be done in 3 level of research (design process);

1.) Transforming the form

In this level, design process will focus on how product attract the market, because besides its basic purpose of design which is fulfil the particular needs of market, the product orientation is focus in exploring tangible aspect of product design to attract audience with the pure business purpose. The method to achieve this design level is by using basic theory of product design focus on visual attraction.

2.) Exploring the Ergonomics

In this level, the research focus on Exploring ergonomics to adjust product design for the needs in working place. The studies to achieve this level is by combining the basic theory of product design and explore its function regarding safety, efficiency, and productivity in workplace. The focus of this level is to create a product which is not only attracting but, helpful for efficiency in workplace.

3.) Affecting Behaviour

In this level the design process involve a scenario setting for product design to manipulate the product interface that will affect the user. By manipulating the interface, user will use the product as an attempt to stimulate new behaviour for user. The goals of this level is manipulate interface that will manipulate user experience, so the user indirectly will have a new way of using product as starting point for behaviour stimulation. The process will conduct by applying empathy which relevant to particular market segmentation.

Design strategy is considered to be one of the pivotal component in cultural and creative design industries, and this will have a significant impact on consumer perception of innovation [12]. By involving norms and value as basic idea to design product, the result of product design process will affect the user. So the idea is creating product with purpose to change/manipulate user behaviour using interface manipulation.
The assessment measurement will be needed to assess the impact of the product. Apply the perfect method of SAD to CHEER, all of three level should be done in the design process by passing the evaluation in every design process level.

4. CASE STUDY OF DAILY PRODUCT DESIGN

One of many product design use in daily activity is chair separate seat for one person, typically with a back and four legs. [14] The first chair Rybczynski was able to identify in the historical record was not a physical chair but a sculpture of one from the Cycladic islands in the Aegean Sea, dated to the period 2,800 - 2,700 B.C. The figurine depicts a musician playing a harp while sitting in what looks like a typical kitchen chair, with a straight back and four legs. By the time of the ancient Egyptians, sitting was a matter of status: Everyone sat on stools or on the ground, but chairs with backs or armrests were reserved for the elite. [5] in today use, chair is an integral part of human activity. In our modern industrial society most people spend a good deal of their lives sitting down. From a heritage of fishermen, hunters and farmers, humanity has developed into a predominantly sedentary race. Our evolution can be a summarized: Homo erectus (upright man) to Homo sapiens (thinking man) to Homo sedens (sitting man). [1]
To get a better understanding about how to distinguish the product design research to reach the studies about ‘Research model in Ergonomic for Product design process in Behavioural Manipulation’. The model that distinguish the studies will help designer to focus on what matter in design process for manipulate behaviour.

Fig. 4 traditional chair (dingklik)

The stage of research will be distinguish into three level and each level will use the case study of chair to give an example for design process. Each level of design process will use the level of assessment measurement from recognition of attraction, realization of accuracy and reflection affection. The stage of the research will be apply in chair by following the figure bellow.

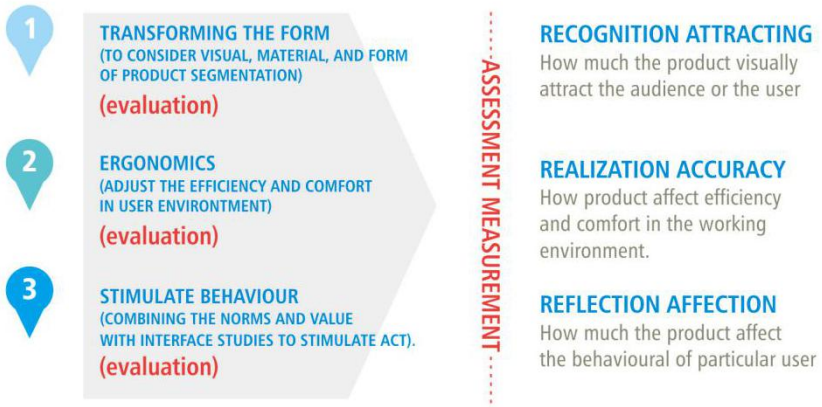

Fig. 5 stage of manipulating behaviour in design process

The chair has its original function to help a person as individual or group to rest their feet or reduce the energy to stand, but the execution process of designing chair is depend on the motive. By dividing the stage of design process by following the idea of 'From SAD to CHEER' model, the research will be group into 3 motives, 1)design for tangible aspect, by transforming the form, 2)design for the environment in work place, and 3) design for a behaviour in the society, by designing product which can stimulate a particular behaviour for the user.

1.1 Transforming the form

The first level of design process motive is focus on tangible aspect such as physical stuff by transforming the form of traditional chair into a product design chair which is attracting by its shape and appearance. The design process of this stage using design rules of how to create an attractive product design.

Fig. 6 transforming form in aesthetic (Jens chair by Jens Risom and Bloom by Kenneth Cobonpue)

Relating to the adaptation model from SAD to CHEER to pass this stage there is assessment measurement that state, how much the product result by this process visually attract the audience or the user. The key factor of this stage is "visually attract" which is define by tangible aspect which can catch by visual factor.

The aspect of visual factor in product design related to something tangible. Search for tangible manifestations capable of projecting the desired attributes through the use of shape, material, texture and Colour. [3]

1.2 Exploring the ergonomics

The second stage of the research is not only focus on tangible aspect. The exploration in the research process should be focus to another aspect of the user. In this context the case will be apply in the workplace. The studies of designing product which suitable in workplace to get the efficiency is mention in ergonomics design studies. Ergonomics focuses on human beings and their interaction with machines, materials, information, procedures and environments used in work and everyday living [1] Ergonomics is the science of fitting the job to the worker. In a phrase, the task/job must 'fit the person' in all respects, and the work situation and environment should not compromise with human capabilities and limitations. [6]

Fig. 7 design into ergonomics aspect (Herman Miller Executive Aeron Task Chair & La-Z-Boy Delano Big & Tall Executive Chair)

At this stage of research designer already include the studies of ergonomics, so the research not only focus on how to create an attractive product design, but also consider the function and user, related to the workplace. From the figure 7 above can be seen, the transformation from the traditional chair into office chair which already consider the high, the size, shape, and the other aspect which could support the comfort of the work process in the office.

Product design process in this stage will be assessment by measure how the product increase the efficiency and comfort in the working environment. The studies of ergonomics involve not only studies in design field, but could involve engineering, medical, and event psychological field. The product which is produce by this studies almost touch the matter of behavioural manipulation in purpose of creating a good environment in workplace, but the impact of this design still in particular segmentation (company or factory), and the studies about manipulate culture behaviour is focus on creating better society which is will be discuss in the next stage.

1.3 Stimulate behaviour

This stage of research is the goal of this studies which is focus in design process that can create a product (daily product design) that can manipulate the user behaviour into particular behaviour based on particular norms or value. The result of the design process could be applied as a public facility product. The final product usually a product with an

interface that manipulate to stimulate particular action, in some case the interface designed to prevent user doing particular behaviour. This studies also argue that the design could manipulate the user behaviour by manipulating product interface which can cause particular action expected from user.

Fig. 8 product design to stimulate particular behaviour (central armrest bench & leaning bench)

The figure above shown a public chair to prevent particular action that represent by anti homeless chair with central armrest. The chair usually installed in public area such park. The purpose of giving central armrest is not to give a border for each seat, but its design to prevent people using bench inefficiently but to prevent the homeless sleep there so the other people couldn't sit on the bench. The other figure called leaning bench, ignoring its controversy, leaning bench indeed efficient for the limited public space. This bench usually installed in high mobile activity area. The purpose of this chair is to design uncomfortable to prevent people sit in those particular area.
Over all this kind of product already stimulate an action to its user because the design of the interface. This product is the real example that in design process, designer could refer to particular goals (could be some purpose to manage user behaviour or achieving particular behaviour from the norms and value).
The assessment of this stage is by measuring how much the product affect the behaviour of particular user. In this case the design process following particular norms and value to manipulate user behaviour which is in line with the norms and value that follow by those particular society. The studies of this stage could be run by applying behaviour planned theory.

5. RESUME

The process in designing product is depend on its motive. Design should not always be done solely for the sake of the industry solely oriented to the satisfaction of users to gain economic benefits. This studies argue that product design should not only focus on commercial purpose only, but also trough product design, designer could participate in the process of creating better society. In the context of designing product which can manipulate user behaviour, there is three stage, the stage adapt from the model of 'from SAD to CHEER' to get a better understanding of three stage of design with each measurement assessment.

- Transforming the form

In this level, design process will focus on how product attract the market, because besides its basic purpose of design which is fulfil the particular needs of market, the product orientation is focus in exploring tangible aspect of product design to attract

audience with the pure business purpose. The method to achieve this design level is by using basic theory of product design focus on visual attraction contain material, shape, colour, and another tangible aspect.

- Exploring the Ergonomics

Human factor theory is is one of the main method. In this level, the research focus on Exploring ergonomics to adjust product design for the needs in working place. The studies to achieve this level is by combining the basic theory of product design and explore its function regarding safety, efficiency, and productivity in workplace. The focus of this level is to create a product which is not only attracting but, helpful for efficiency in workplace.

- Affecting Behaviour

Planned behaviour theory is one of the method to reach this stage of research. In this level the design process involve a scenario setting for product design to manipulate the product interface that will affect the user. By manipulating the interface, user will use the product as an attempt to stimulate new behaviour for user. The goals of this level is manipulate interface that will manipulate user experience, so the user indirectly will have a new way of using product as starting point for behaviour stimulation. The process will conduct by applying empathy which relevant to particular market segmentation.

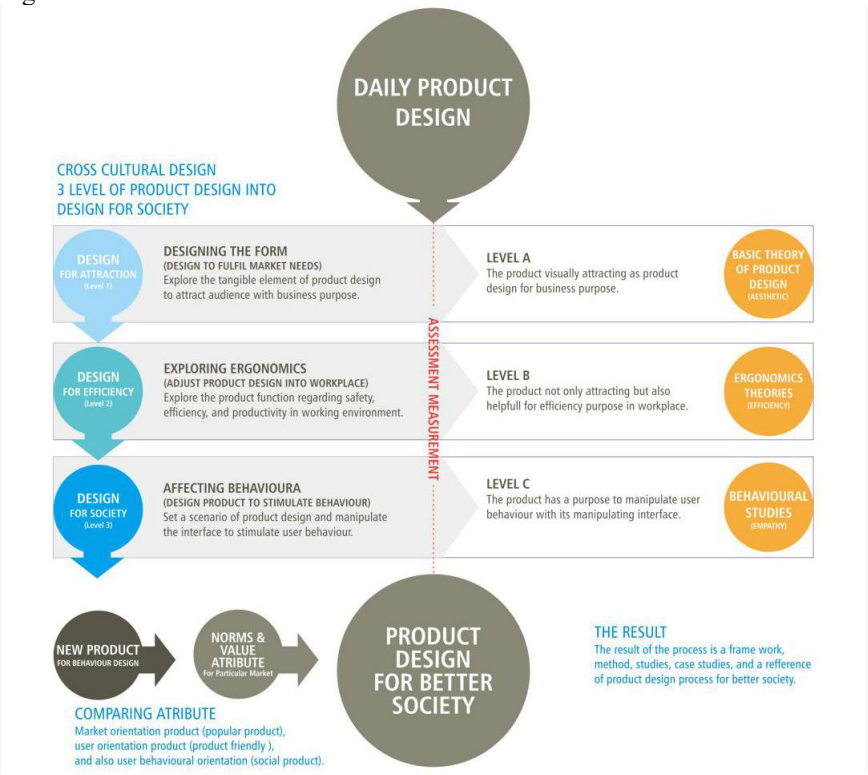

Fig. 9 stage of design process in behavioural manipulation

The three stage of this research could be a way to distinguish the motive in product design process. First stage of design which focus on how to create product that visually attracted is relevant to be applied in design process to create product for economical purpose, how to attract audience so they has desire to buy the product because its attraction. The second level which focus on ergonomics is relevant to semi business product with particular segment, especially for company purpose, so the user or particular community will increase the production by its efficiency. The third stage of the studies could be focus on how to create better society, because not all of the product will bring comfort to the user, but by these kind of product the user could get a better behaviour which is relevant to their particular norms on social value.

REFERENCES

[1] Boro, Wiliam J., Psaromatis, Mary: *Chiropractic Center*, *Available from* https://goo.gl/Hti7sq, *accessed*: 2018/04/20
[2] Brown, Tim dan Jocelyn Wyatt (2010) *Design thinking for social innovation.* Stanford Social Innovation Review Winter. STANFORD. Graduate School of Business.
[3] Crilly, Nathan., Moultrie, James., Clarkson, P. John., 2004.: *Seeing things: consumer response to the visual domain in product design, Design Studies*, 25(6), 547–577.
[4] Donald A. Norman: *Emotional-Design, Why We Love (or Hate) Everyday,* Published by Basic Books, A Member of the Perseus Books Group Basic Books, 387 Park Avenue South, New York, NY 10016-8810, (2004)
[5] Friedman, Uri.: *A global history of sitting down*, *available from* website: theatlantic.com, https://goo.gl/DJUHdt, *accessed on* 2016/08/30
[6] Iqbal, Mohammad., Iqbal A. Salma., Rahman, A.N. Mustafizur, Samsuzzoha, A.H.M.: *Ergonomics and Design*, International Conference on Industrial Engineering and Operations Management, Kuala Lumpur, Malaysia, (2011)
[7] Koentjaraningrat. 2000. *Pengantar Ilmu Antropologi. Jakarta* : Rineka Cipta Agus M. Hardjana. (2003). Komunikasi intrapersonal & Komunikasi Interpersonal. Yogyakarta: Penerbit Kanisius.
[8] Liliweri, A.: *Gatra-gatra komunikasi antar budaya*. Yogyakarta: PT. LKiS Pelangi Aksara (2002)
[9] Lin, R., Sun. M.X., Chang, Y.P., Chan, Y.C., Hsieh, Y.C., Huang, Y.C.,(2007): *Designing "Culture" into Modern Product -- A Case Study of Cultural Product Design*. In: Conference Paper DOI:10.1007/978-3-54--7328-7_19. DBLP
[10] Lin, R., Hsieh, H.Y. Sun, M.X., Gao, Y.J. (2016): From ideality to Reality- a Case Study of Mondarian Style. In: Springer International Publishing Switzerland, 2016, . pp. 365-376
[11] Lin, R., (2007). *Transforming Taiwan Aboriginal Cultural Features into Modern Product Design: A Case Study of a Cross-Cultural Product Design Model*. International Journal of Design, 1 (2), 45-53
[12] Lin, R. (2012). *A Discourse on the Construction of a Service Innovation Model: Focus on the Cultural and Creative Industry Park. In: E-Business - Application and Global Acceptance*, Prof. Princely Ifinedo (Ed.), ISBN: 978-953-51-0081-2, InTech, *Available from*: https://goo.gl/Jygpwz

[13] Lin, R., Chen. C.T.: *A discourse on the construction of a service innovation model: focus on the cultural and creative industry park.* In: Ifinedo, P. (ed.) E-BUSINESS- Application and Global Acceptance, pp. 119-136. Croatia, InTech (2012)
[14] Oxford Dictionary Online, *available on* https://goo.gl/1XGvFD, *accesed:* 2018/04/01
[15] Pirous, A.D.: *The story of visual communication design*. *Available on* Youtube: 8:50/10:00. Amphibi studio: https://goo.gl/7EHGGM
[16] Papanek, Victor. *Design for the Real World: Human Ecology and Social Change*, New York, Pantheon Books. (1971)
[17] Tosi, Francesca: *Ergonomics and sustainability in the design of everyday use products,* Work, 41. 3878-3882. 10.3233/WOR-2012-0055-3878, (2012)
[18] jonathan smiley, Zurb.: *9 ways to manipulate people with design -"Designing product is about designing experience, available on* https://goo.gl/qKgJdx accessed: 2018/04/20
[19] Rybczynski, Witold.: website: the paris review, *available on* https://goo.gl/U5S8Tv, *accessed*:2016/08/23
[20] Sanders, Mark S. and McCormick Ernest J, 1992, *7th edition, Human factors in engineering and design,* McGraw-Hill, Inc.Sanders, Mark S. and McCormick Ernest J, 1992, 7th edition, Human factors in engineering and design, McGraw-Hill, Inc.

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Jens chair : https://goo.gl/dQTwFs
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Parker leaning bench : https://goo.gl/bGmfEM