

Optimizing Creative Space in supporting Creative Behaviour: A Brief Description for Design

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Abstract

As a part of developing the growth of creative industrials in Indonesia, the development of new Creative Hubs has become a progressive trend almost every year as the British Council research team found its significant growth between 2005 and 2010 in Indonesia. It became one of government and private sectors focus in enlarging the creative industry as it offers comprehensive functions and almost no boundaries for development. In regards of this, the Creative Hubs needs to be able to support the industries in their works and by which, its need to be optimized appropriately in purpose to be well-functioned. Thus, this study aims to obtain aspects that can be applied in Creative Hubs, as a creative space, in supporting the talents in their works by taking qualitative research method with empirical approaches such as comparative studies through journals followed by questionnaire results study. This study found there are different kind of responses when humans were experiencing a room with different kind of aspects such as emotional changes by using a specific colour or comfortable sensation when surrounded with wooden material. In which, the result of this research is a brief description of aspects that can be optimized in Creative Hub to support the user's creative behaviour. By it means, this research can be used as guidelines for designing Creative Hub or a similar creative space that can support users' creative behaviour which will support creative industry growth. Thus, marking sustainable architecture goals by sustainable development.

Keywords

Creative Space, Creative Industry, Creative Behaviour, Architecture, Comparative Study, Design Guidelines, Behaviour, Creative Hub, Sustainable Development

1. Introduction

Creative Hub, the largest form of Creative Space which include function of Co-working space and Makerspace, has growing massively in almost every country, including Indonesia. By its function, supporting the growth of creative industries has become the reason on why the government and even private sectors start to focus on developing new Creative Hubs (Soenarso, 2020; Fikri, 2021). Especially in Indonesia, where the creative industry is in the developing stage and prospecting from its potential, Indonesia's creative industry can take the major roles in earnings sources in Indonesia (Tribuntechno, 2020).

As the creative industry sectors forms that starting to wider and becoming more approachable to the public, especially because of the development of digital era, without a doubt that the numbers of talents or even potential talents start to grow significantly. However, problems come when the values offered by talents are low. This problem has become one of the main reasons the Creative Industries in Indonesia proliferates slowly, due to many undeveloped talents and

out of criteria from the international standard. The problem can be stopped if there is help from the professional in polishing the creative talents, especially professionals who have been working with international standard. Thus, helping the talents by contribute to their learnings or sharing, especially in pursuing remarkable and significant growth in creative industry sectors (R, 2019; Dovey, et al., 2016). In which, on why the government and private sectors start to focus on funding the development of new creative spaces, especially creative hubs, projecting for growth of the creative industry.

The good news is that the number of creative spaces, especially creative hubs built in Indonesia, has started to grow progressively since the first massive grow between 2005 and 2010 and projected to keep increasing around 2022 and 2023 (Soenarso, 2020; Siregar & Sudrajat, 2017). However, the problems came when the existing creative spaces started to be abandoned by the talents. Such as the case of creative hub that started to be abandoned by talents due to its “scary” rooms (Ispranoto, 2019). It is a unique case where a full equipment facilitated creative hub getting left out by the talents due to their perception of the room, which makes them feel uneasy or uncomfortable. Thus, it needs to optimize the creative space rooms to make them well-functioned and well-responded for the talents.

Therefore, those reason makes the creative space required to be well-optimized and well-arranged. In supporting the creative talents, optimizing the room in the manner of creative behaviour need to be applied to support talents well (Robbins & Judge, 2015). Mainly to grow the creative talents in Indonesia and in location where talents and communities of creatives can be found such as Tb. Simatupang, South Jakarta.

From what was stated before, the impact from the creative hub will concern with social, human environment, and economic growth. Thus, according to the United Nations 2030 agenda on sustainable development goals, the creative hub’s impact will project to the United Nations goals for sustainable development through creating sustainable cities and communities (United Nations SDGS, n.d.; United Nations, n.d.; United Nations SDGS, n.d.). Therefore, a creative hub project in Indonesia will lead to sustainable architecture by supporting sustainable development.

1.1 Objectives

The objective of this study is to obtain aspects that can responds well with creative behaviours, in purpose to be applied or designed in a creative space, especially creative hub, for supporting the talents on their works in creative space, therefore will lead to sustainable architecture through sustainable development.)

2. Literature Review

2.1. Creative Hub

Creative Hub is a space, either its form physical or virtual, that aims to gather creative communities. It has function to organize, offers spaces and support for wider connection, business growth, and communities (Dovey, et al., 2016). It sectors resolve on creativity, culture, and technology (Siregar & Sudrajat, 2017). As if extracted by words, Creative Hub is a place where there is activity that has creativity (Cambridge Dictionary; Cambridge Dictionary).

As from physical function, Creative Hub is the largest form of Creative Space which including the function of other creative spaces such as Co-working Space and Makerspace. This physical form can be leasing space or building with facilities that focus on supporting the creative industry. Its facilities can be variants, such as recording studio, meeting, co-working spaces, classroom, and library. Furthermore, not limiting any kind of rooms as long it can support the creative industries in developing their works.

2.2. Creative Behaviour

Creative Behaviour is a condition where there are productivity activities exist (Robbins & Judge, 2015). Productivity activities include formulate problems, gathering information, exploring ideas, and evaluating ideas. Which from those productive activities, effective outcomes that solve the user problems are expected or known as Creative Behaviour. It continues that there are things that can trigger this behaviour appear, in which creativity potential and creativity environment.

The creativity potential is in form of the human itself. For instance, basic knowledge of the person. Creativity environment is an environment where creative potential can be found and realized. Things that can impact creativity’s effectivity from the creativity environment is intrinsic motivation, freedom or independency in

processing ideas, and study cultures. Concludes from the information, it can reveal that those things will correlate into each other and can be made as a framework in searching the results, in which:

- Creativity Environment can be effectively appeared by optimizing the space in behave of triggering its values.
- Creative Behaviour can be effectively appeared when the creativity environment responds well to the productivity activities.

Thus, this research requires to study what things from the space that can be a supportive aspect in creating the Creative Behaviour from journals that has been published.

2.3. Trigger of Existence

Through journals that have been gathered, in purpose to trigger the existence of creative behaviour, there are several aspects from rooms that can leads for its arising, which are:

2.3.1. Colours

The effect of room colours has been discussed in many journals. Colours have various effect on humans, such as stimulant effects and physiological effects (Savavibool, Gatersleben, & Moorapun, 2018; Kamaruzzaman & Marinie, 2010). Which stated from 40 studies over various journals, 16 studies focused on the preference of colours, 21 studies focused on mood and emotion, six studies focused on physiological and well-being, and 18 studies focused on outcomes. From those studies, gathered new results in which:

- Studies that focused on colour preferences have been found that colours can affect mood, well-being, and performance in work situation (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011). White has been found the most preferred neutral colours in the workplace, and users who focused on works preferred to work in environment with white colour scheme (Nancy, 1996).
- Studies that focused on mood and emotions have found that green colours are the most positive responses colours and are affiliated with relaxation and happiness (Kaya & Epps, 2004). Blue responds with positive energy than red colours in open space, but if not correctly applied can result in depression. Red can increase the stimulant of the user but can distract. White has the tendencies to be boring and not attractive.
- Studies that focused on physiological and well-being, red colours or other colourful colours with good visual arrangement can attract the interest of human brain, reduce heart pressure and tiredness. Blue can lead to sleepiness. A combination of blue and green can be associated for well-being.
- Studies that focused on the outcomes have found that colourful workplaces can increase workers performance much better that achromatic colour. Red colour can increase cognitive task performance and blue can increase performance in creativity task.

From studies that have been done, the existence of colours indeed a crucial aspect in a place that require high concentration and attention (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011). Choosing the right colours is needed to increase the productivities of the user. For instance, place that need high concentration can use the natural scheme colours, and rooms that focused on numeric procession can use the blue colours scheme.

2.3.2. Woods

Information about woods and its effects on human is limited, but for the last few years, its numbers started to increase with its various methods and effects such as increasing blood pressure, brain activity, sensation, visual, and hearing (Ikei, Song, & Miyazaki, Physiological effects of wood on humans: a review, 2016; Nyrud, 2010).

From the research that have been done by examining subject in different environment, the environment that still exposed to natural materials such as wood can lead to lower blood pressure and heart rate, which reduces anxious and increases refresh rate and comfort (Tsunetsugu, et al., 2007; Park, et al., 2009).

Another research examined subjects by using different materials such as curtain, hinoki panel, and white steel (Sakuragawa, Miyazaki, Kaneko, & Makita, 2005). From this research, it has been found that there is a significant difference of responses, such as in environment with hinoki panel reduce the depression of subject significantly than other materials, whereas with white steel panel has contrast result in terms of depression.

Other journals also researched the texture of woods materials, which it has been found that in every test of it, woods have consistent effect in increasing the comfort for humans (Ikei, Song, & Miyazaki, Physiological Effects of Touching Coated Wood, 2017).

2.3.3. Lighting

The uses of lighting can influence the human behaviour such as productivity can be seen by its different appliance of lighting such as intensity of lights and arrangement of light as it should be comfortable for the user, in which not to bright, not to dark and not distracting the visual of user (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011; Papinutto, Nembrini, & Lalanne, 2020). Different types of colours from lights also can influence the behaviour of human. For instance, blue-enriched white lighting can increase the user’s alertness and performance, which increase the user’s concentration (Keis, Helbig, Streb, & Hille, 2014).

2.3.4. Arrangement Space.

The arrangement of spaces or layout in workplaces can influence the efficiency of works, focus, and communication, in which why different kind of arrangement for space need to be decided, especially if it has different focus such as individual workplaces and group workplaces (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011).

More derived that in considering the arrangement of space can be focused by its function: focus, collaborate, and study (Ondia, Hengrasme, & Chansomsak, 2018).

2.3.5. Decorative.

The appliance of decorative elements, especially natural decorative such as plants, have been found to reduce the stress of user in workplace (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011; Relf, 1990). Other decorative such as paintings, inspirational, and motivational quotes can also be applied as it can increase self-esteem and mood of the user. Also, other research found that motivational words can help to reduce depression and encourage user (Bedrov & Bulaj, 2018).

2.4. Sustainable Development


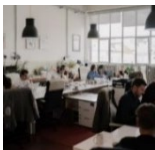
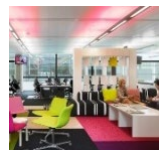
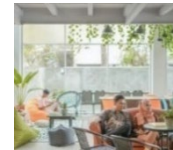

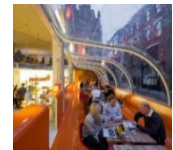
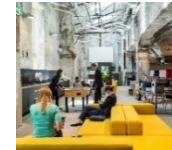
Sustainable development, as stated by the United Nations, is a universal action to achieve peace and prosperity for all people by 2030. People, planet, prosperity, partnership, and peace are the main concern from this act, which is classified into 17 goals of involvement for sustainable development. Goal 11, which is to create sustainable cities and communities, is one of the 17 goals which concern the human environment, settlement, culture, and economic growth (United Nations SDGS, n.d.; United Nations, n.d.; United Nations SDGS, n.d.).

3. Methods

This research was conducted using the qualitative method with an empirical approach, using literature studies and online questionnaires for data gathering. The questionnaires will revolve around studies that have been done and reflect aspects from them.

3.1. Questionnaire

Table 1. Samples of questionnaires.

Sample of places used in Questionnaires						
Artscape Daniels (A)	Creative Hub Luxembourg (B)	BBC North Creative (C)	Creative Hub Semarang (D)	Jakarta Creative Hub (E)	Second Home London (F)	Tallinn Creative Hub Estonia (G)
						

In this study, subjects will be targeted from the creative industries sector and need to answer several questions regarding to the photo above. Subjects have also been given several open questions in which they need to give their opinion on things that are asked. The questions are:

Table 2. Questions given to respondents.

Questionnaires
Which samples that give you the most comfort?
Which samples that give you calm feeling?
Which samples that can make you more productive in works?
Which samples that can encourage you to works more?
Which samples that can make you inspired when searching for idea?
Which samples that support you to freely explore your works?
Which samples that suit you the most when you need concentration?
Which samples that suit you the most when you need to work in group or collaborate?
Which samples that suit you the most when you need to socialize?
Which samples that suit you the most when you need to study?
Which samples that can make you feel distracted such as confused, tired, or anxious?
Which samples that suit you the most when you need to work 8 hours straight or more?
Which samples that suit you the most when you want to produce works from 0 until finish?
Which samples that give your needs the most?
Which samples that support you the most when you are in depressed and need to finish your works?
What characteristics from Creative Hub that you want? (Open question)
What characteristics from Creative Hub that you did not want? (Open question)

4. Results and Discussion

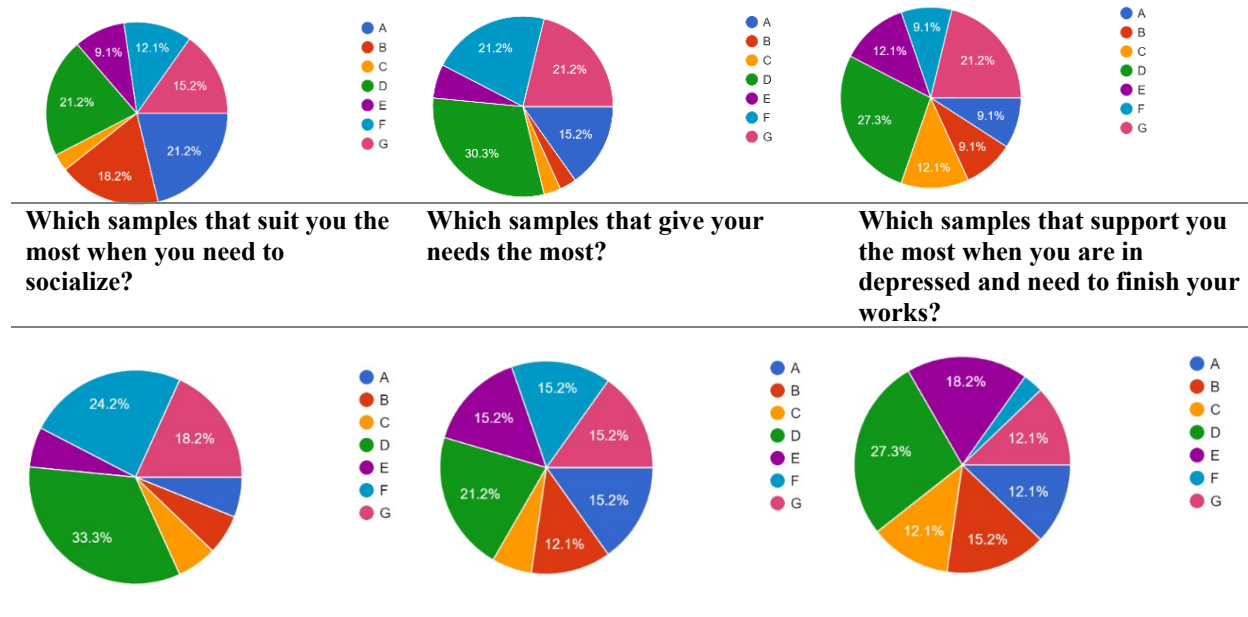
Respondents consist of 23 female respondents and 13 male respondents, where only 33 respondents that are eligible to enter the criteria, which is respondent who work or have been in the creative industries. From the responds that have been gathered and answer that have been review, there are several results regarding to the data and journals studies, in which:

4.1. Responds focused on improving intrinsic motivational, inspiration, comforts, and endurance.

Results from the questionnaire gathered that this sample is the most selected by respondents in responding to intrinsic motivation, inspiration, comforts, and endurance.

Table 3. Results from questionnaires regarding motivational, inspiration, comforts, and endurance.

Which samples that give you the most comfort?	Which samples that can encourage you to works more?	Which samples that give you calm feeling?
Which samples that can make you more productive in works?	Which samples that can make you inspired when searching for idea?	Which samples that suit you the most when you need to work 8 hours straight or more?



From the results above, choosing scheme colours of the achromatic base with a combination of natural colours such as green can be considered for increasing intrinsic motivational, inspiration, comforts, and endurance. It reflects green colour having the most positive responses and associated with happiness and relaxation (Savavibool, Gatersleben, & Moorapun, 2018; Kaya & Epps, 2004). With a good colour combination, it can improve moods and performance (Öztürk, Yilmazer, & Ural, 2012; Lebedkova, Panteleeva, & Stepanova, 2012). A warm scheme also can be applied, but it must be considered since warm colour can be overstimulating and result in difficulty to concentrate. However, too much RGB contrast and monochrome scheme with cool colours should be avoided because this colour has been found to be the most avoided by the respondent and over-distracting.

The uses of woods can be seen in this samples along with other natural elements such as plants. This appliance reflects on the previous studies, in which the uses of woods can reduce depression states and increase comforts and calm feels (Tsunetsugu, et al., 2007; Sakuragawa, Miyazaki, Kaneko, & Makita, 2005; Ikei, Song, & Miyazaki, Physiological Effects of Touching Coated Wood, 2017). As a result, appliance of woods can be considered as it can help to stabilize the user’s psychology and physiological states.

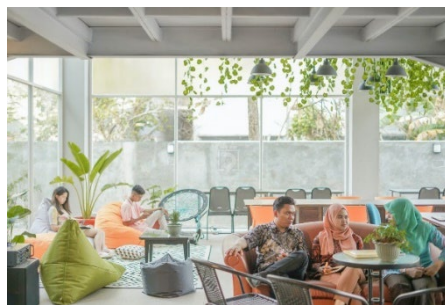


Figure 1. Creative Hub Semarang - D (*Coworker.com*)

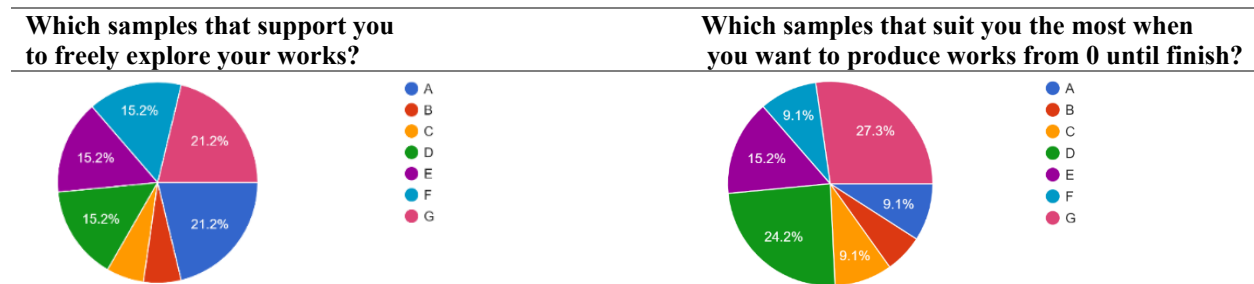
As the lighting, it is evident that samples applied natural lighting for the rooms. It can be used but need to be properly arranged as it needs to be comfortable for the user and not distracting for the user (Papinutto, Nembrini, & Lalanne, 2020). There are also separates open question respondents who also prefer lighting that focuses on the workplaces as this kind of lighting.

From the questionnaire, the respondents want proper distances between individuals and groups. It has been revealed that respondents are quite sensitive about personal or group distances, mainly focusing on work. This reflects on studies about social environment, in which humans need to have specific distance because it can affect human behaviour such as their comforts, secure feels, intimidated and other emotional feels that can distract their activities (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011; Toastmasters International, n.d.). Thus, adapting from this reason, separating distance can be made by distance arrangement, use of partitions, and specific models of furniture that can separate the user feel of space.

In this sample, plants dominate the most in creating natural colour and give a good scheme with the achromatic base. This kind of optimization can be considered when it comes to uses of decorative.

4.2. Responds focused on the needs of exploring in work.

Table 4. Results from questionnaires regarding the needs of exploring work.



From the responses gathered, in purpose to develop the exploring ability in creative works, these samples are the most selected by the respondents. From these samples, it is evident that achromatic scheme with a combination of cool colours with analogue scheme such as red to yellow might be considered. This kind of scheme reflect on cool colours, which can help in searching for ideas and thinking (Canan, Dul, & Serpil, 2008). Colours that might be avoided are monochrome colours with a combination of cool colours since respondents have avoided them the most.

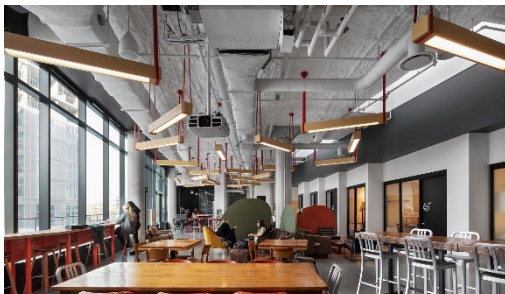


Figure 2. Artscape Daniels - A (Michal, 2019)

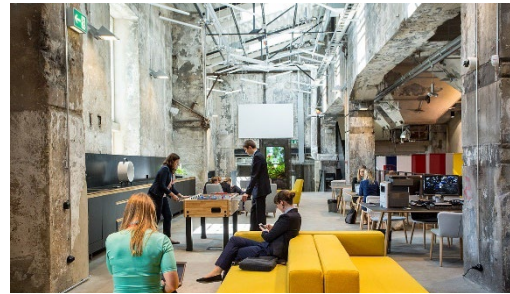


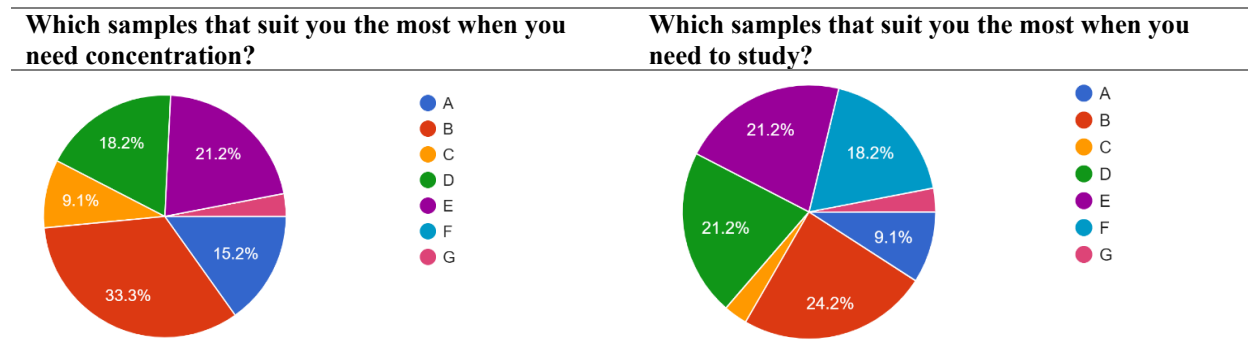
Figure 3. Tallinn Creative Hub - G (Wikimedia Commons, 2017).

The uses of woods can be seen on both samples and mainly on the furniture, which might be considered. Both samples also shown to use out-door lighting and in-door lighting. Both samples have materials that can reflect the lighting, which makes the room brighter. It also preferred by several respondents through open question that natural and reflective materials can be used.

When it comes to distance, both samples also have shown specific distance between each function such as leisure space, individual working spaces, and working group spaces. Also, decorative can be seen on both samples, shaped in the unique form of partitions and plants.

4.3. Responds focused on obtaining concentration, focus, and study.

Table 5. Results from questionnaires regarding the needs of study.



For obtaining concentration, focus, and study, the B sample is the most selected by respondents. From this sample, it can be seen the neutral colour scheme, white, with a combination of cool colour might be considered. This scheme, which is white colour scheme, is preferred in the workplace environment (Nancy, 1996). This scheme also produces errors the most, which is needed when it comes to developing phase in works. With the combination of red, it can improve the cognitive task performance of the user (Mehta & Zhu, 2009). Colour that are avoided by respondents is achromatic colour with combination of colourful furniture.

Wood materials are quite hard to be seen from its colours. This might be not considered as it left the means of stabilizing the human states, especially during high concentration and work phase.

In this samples, in-door and out-door lighting also can be seen applied. In-door lighting can be seen focused on the workplaces, which is direct lighting to the tables and out-door lightings can be seen not distracting to the user. Reflective materials in this samples can be seen on its furniture, which reflect the light and make the workspace brighter.



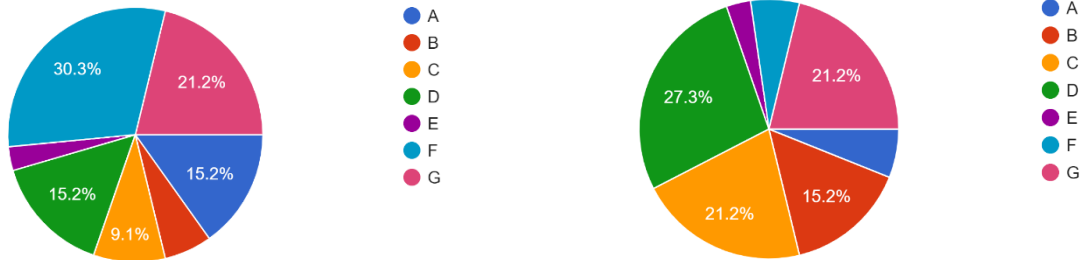
Figure 4. Creative Hub Luxembourg – B (1535.lu, n.d.).

Arrangement of spaces in this room can be seen by the uses of furniture such as wide desk and cabinet (Hall, 1966). In which by creating territories and keep the personal space available (Ondia, Hengrasme, & Chansomsak, 2018; Ivanovic, 2014; Zeisel, 1984). Arrangement that might be consider is the space that have combined function such as leisure spaces, individual spaces, and workspaces which might disturb and responds badly from the questionnaire. Plants can be seen placed in almost every corner and need to be considered to reduce stress from the user during work (Kamarulzaman, Saleh, Hashim, Hashim, & Abdul-Ghani, 2011).

4.4. Responds focused on work in group or community.

Table 6. Results from questionnaires regarding on work in group or community.

Which samples that suit you the most when you need to work in group or collaborate?	Which samples that can make you feel distracted such as confused, tired, or anxious?
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The F sample have the most favourable results when working in a group, organization, or community. From the sample, it can be seen warm colours scheme with analogue combination can be used, especially if using natural material such as wood. Neutral colour, in which white, can be seen as floorings and furniture. This kind of colours scheme reflect, in which using warm colours, offers stimulant effect and use of natural colour from natural material such as woods can reduce the stress rate and increase relaxation (Savavibool, Gatersleben, & Moorapun, 2018; Masuda, 1985). From it, the user can keep focus while feeling relaxed. Colour that might be considered to avoid is neutral colour scheme.

Woods can be seen dominating the colour scheme either by its furniture and wall colour. This kind of use reflect on previous studies on woods, in which the woods can help stabilize human physiology and psychology (Ikei, Song, & Miyazaki, Physiological effects of wood on humans: a review, 2016; Tsunetsugu, et al., 2007; Sakuragawa, Miyazaki, Kaneko, & Makita, 2005).



Figure 5. Second Home London - F (Wainwright, 2018)

Lighting can be seen mostly using in door lights, followed by out-door lighting. The colour of lights can be seen using bright yellow, which improve the warm colours scheme.

The arrangement of space in this sample can be seen has specific distance between every table, which should be considered as it can protect the privacy of individual or groups, reduce distract from other users, and has more space to work.

5. Conclusion

From the results gathered, it is evident that there are different responses when humans had been faced with different kinds of room. Especially from the responses through questionnaire, it is evident that every individual response will change when they meet a specific condition.

By those mean, optimizing things in creative spaces such as colour scheme, material choosing, and other things from the spaces need to be considered as it can lead to different responds behaving its function.

Thus, in purpose to achieve a creative space, especially creative hub, that can respond to creative behaviour, adapting on variables from the spaces is needed, such as optimizing the colours scheme, choosing right materials, arrange the most suitable layout, and other variables that can results in well-responds space to creative behaviour.

From this research, variables that can proceed in creative behaviour appearance have been obtained, in which colour, woods material, lighting, arrangement of space, and decorative. Specific adjustment also requires to be applied to creative spaces based on their function. For example, endurance and motivation function can use combination of achromatic colour and natural colour, adding wooden experience, allowing adequate lighting, arranging distance between spaces, and adding plants as colour scheme. As research result, every function, either its focus function, community function, motivation function, and exploring function, has its unique and different setting of variables. In which, knowing what function and variables setting is mandatory. Followed by avoiding cross set-up or random applying variables should be done, or else it will not assist the user's creative behaviour but distract the user. That is why it is required to adjust creative spaces based its function and variables settings in purpose to be well-responds with creative behaviour, thus resulting in sustainable development through creating a supportive place for creative industry growth.

References

- Bedrov, A., & Bulaj, G., Improving Self-Esteem With Motivational Quotes: Opportunities for Digital Health Technologies for People With Chronic Disorders. *Frontiers in Psychology*, 9, 1-5.20, 2018.
- Cambridge Dictionary. (n.d.). *dictionary.cambridge.org*. Retrieved July 4, 2021, from <https://dictionary.cambridge.org/dictionary/english/creative>
- Cambridge Dictionary. (n.d.). *dictionary.cambridge.org*. Retrieved March 7, 2021, from [dictionary.cambridge.org: https://dictionary.cambridge.org/dictionary/english/hub](https://dictionary.cambridge.org/dictionary/english/hub)
- Canan, C., Dul, J., & Serpil, A., Can the Office Environment Stimulate a Manager's Creativity? *Human Factors and Ergonomics in Manufacturing & Service Industries*, 2008.
- Coworker.com, from: <https://www.coworker.com/indonesia/semarang/collabox-creative-hub>.
- Dovey, J., Pratt, A. C., Moreton, S., Virani, T., Merkel, J., & Lansdowne, J., *Creative Hubs: Understanding the New Economy*. London: British Council, 2016.
- Fikri, D. A., *SINDONEWS.com*. (SINDONEWS.com) Retrieved March 23, 2021, from <https://ekbis.sindonews.com/read/334140/34/mnc-group-bangun-movieland-sebagai-creative-hub-wamen-angela-optimistis-parekraf-ri-bangkit-1613221340>, 2021.
- Hall, E. T., *The hidden dimension*. Garden City: Doubleday, 1966.
- Ikei, H., Song, C., & Miyazaki, Y., Physiological effects of wood on humans: a review. *J Wood Sci*, 2016.
- Ikei, H., Song, C., & Miyazaki, Y., Physiological Effects of Touching Coated Wood. *International Journal of Environmental Research and Public Health*(14), 773, 2017.
- Ispranoto, T., *detikNews*. Retrieved March 4, 2021, from <https://news.detik.com/foto-news/d-4387777/ruang-kreatif-bandung-kini-sepi-bak-gedung-hantu-di-pusat-kota/4>, 2019.
- Ivanovic, G. W., People as place-making coordinate: A methodology for visualizing personal spaces. *Frontiers of Architectural Research*, 3, 36-43, 2014.
- Kamarulzaman, N., Saleh, A. A., Hashim, S. Z., Hashim, H., & Abdul-Ghani, A. A., An Overview of the Influence of Physical Office Environments towards Employees. *Procedia Engineering*(20), 262-268, 2011.
- Kamaruzzaman, S. N., & Marinie, E., Influence of employees' perception of colour preferences on productivity in Malaysia office buildings. *Journal Of Sustainable Development*(3(3)), 283-287, 2010.
- Kaya, N., & Epps, H. H., Relationship between color and emotion: A study of college students. *College Student Journal*, 38(3), 396-405, 2004.
- Keis, O., Helbig, H., Streb, J., & Hille, K., Influence of blue-enriched classroom lighting on students' cognitive performance. *Trends in Neuroscience and Education*, 3, 86-92, 2014.
- Lebedkova, S. M., Panteleva, N. S., & Stepanova, I. V., Influence on Visual Working Capacity of Colour Decoration of the Workplace for Work with a Computer. *Light and Engineering*, 20(3), 40, 2012.
- Masuda, M., Influence of color and glossiness on image of wood (in Japanese). *Curr Jpn Mater Res*(34), 972-978, 1985.
- Mehta, R., & Zhu, R. J., Blue or red? Exploring the effect of color on cognitive task. *Science*, 2009.
- Michal., from: <https://www.officelovin.com/2019/11/a-tour-of-artscape-daniels-launchpads-new-toronto-coworking-space/>, 2019.

- Nancy, K., Office Wall Color: An Assessment of Spaciousness and Preference. *Perceptual and Motor Skills*, 83(1), 49-50, 1996.
- Nyrud, A. Q., IS INTERIOR WOOD USE PSYCHOLOGICALLY BENEFICIAL? A REVIEW OF PSYCHOLOGICAL RESPONSES TOWARD WOOD. *Wood and Fiber Science*, 42(2), 202-218, 2010.
- Ondia, E. P., Hengrasmee, S., & Chansomsak, S., Spatial Configuration And Users' Behavior In Co-Working Spaces. *YBL Journal of Built Environment*, 6(1), 20-36, 2018.
- Öztürk, E., Yilmazer, S., & Ural, S. E., The effects of achromatic and chromatic color schemes on participants' task performance in and appraisals of an office environment. *Color Research & Application*, 37(5), 359-366, 2012.
- Papinutto, M., Nembrini, J., & Lalanne, D., "Working in the dark?" investigation of physiological and psychological indices and prediction of back-lit screen users' reactions to light dimming. *Building and Environment*, 2020.
- Park, B. J., Tsunetsugu, Y., Kasetani, T., Morikawa, T., Kagawa, T., & Miyazaki, Y., Physiological Effects of Forest Recreation in a Young Conifer Forest in Hinokage Town, Japan. *Silva Fennica*(43(2)), 291-301, 2009.
- R, J. I., *Liputan6.com*. Retrieved February 22, 2021, from Liputan6.com: <https://www.liputan6.com/tekno/read/3905244/sdm-masih-jadi-tantangan-besar-indonesia-hadapi-industri-40>, February 2019.
- Relf, D., Psychological and sociological response to plants: Implications for horticulture. *HortScience*, 25, 11-13, 1990.
- Robbins, S. P., & Judge, T. A., *Perilaku Organisasi Edisi 16*. Lenteng Agung, Jakarta: Salemba Empat, 2015.
- Sakuragawa, S., Miyazaki, Y., Kaneko, T., & Makita, T., Influence of wood wall panels on physiological and psychological responses. *J Wood Sci*(51), 136-140, 2005.
- Savavibool, N., Gatersleben, B., & Moorapun, C., The Effects of Colour in Work Environment : A systematic review. *Asian Journal of Behavioural Studies*(3(13)), 149-160, 2018.
- Siregar, F., & Sudrajat, D., *Enabling Spaces: Mapping creative hubs in Indonesia*. Harmoni, Jakarta Pusat: Centre for Innovation Policy and Governance, 2017.
- Soenarso, S. A., *Kontan.co.id*. (Kontan.co.id) Retrieved March 23, 2021, from <https://nasional.kontan.co.id/news/kemenparekraf-bangun-5-creative-hub-dalam-setahun-ke-depan>, August 2020.
- Toastmasters International. (n.d.). *Books of body language*. Retrieved from westsidetoastmasters.com: https://westsidetoastmasters.com/resources/book_of_body_language/chap9.html
- Tribuntechno., *Tribunnews*. Retrieved March 14, 2021, from Techno: <https://www.tribunnews.com/techno/2020/09/29/bambang-ps-brodjonegoro-ekonomi-kreatif-dan-digital-sumber-pertumbuhan-indonesia-tahun-2025>, September 2020.
- Tsunetsugu, Y., Park, B. J., Ishii, H., Hirano, H., Kagawa, T., & Miyazaki, Y., Physiological Effects of Shinrin-yoku (Taking in the Atmosphere of the Forest) in an Old-Growth Broadleaf Forest in Yamagata Prefecture, Japan. *Journal of Physiological Anthropology*(26), 135-142, 2007.
- United Nations SDGS. *sdgs.un.org*. Retrieved October 22, 2021, from <https://sdgs.un.org/2030agenda>
- United Nations SDGS. *sdgs.un.org*. Retrieved October 22, 2021, from <https://sdgs.un.org/topics/sustainable-cities-and-human-settlements>
- United Nations. *un.org*. Retrieved October 22, 2021, from <https://www.un.org/sustainabledevelopment/cities/>
- Wainwright, O., *Wonky desks, giant fig trees and mindfulness classes: is this the office of the future?* (<https://www.theguardian.com/artanddesign/2018/jan/23/wonky-desks-giant-fig-trees-mindfulness-classes-second-home-holland-park-office-future>), 2018.
- Wikimedia Commons, from: [https://commons.wikimedia.org/wiki/File:Interior_design_of_the_Tallinn_Creative_Hub_\(Kultuurikatel\)_ \(3535_0356683\).jpg](https://commons.wikimedia.org/wiki/File:Interior_design_of_the_Tallinn_Creative_Hub_(Kultuurikatel)_ (3535_0356683).jpg).
- Zeisel, J., *Inquiry by Design: Tools for Environment-Behaviour Research*. Cambridge: Cambridge University Press, 1984.1535., from: <https://www.1535.lu/members/neopixl>.

Biography

Gerald Rahul Tiopan Lumban Tobing is an architecture graduate from Bina Nusantara University. His thesis took a cross-major study approach because he was interested in learning about the relation between architecture and its effect on human psychology, which was titled "Digital Creative Hub Dengan Pendekatan Arsitektur Perilaku di Tb Simatupang, Jakarta Selatan". When enrolled in the Binus University Architecture study program, he majored in the real-estate study program. During the study period, he took an internship in one of the biggest

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