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Modular Furniture System at the Office of PT. Redpot Indonesia

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ABSTRACT

The modern workspace faces the challenges of accommodating a primarily younger workforce, demanding both productivity and stimulation. While extensive attention has been given to ergonomic designs of office facilities to cater to physical comfort, there's a noticeable gap: aligning seating designs with office branding and addressing employee psychological well-being. This connection between the physical environment and employee psychology, well-entrenched in academic literature, remains underexplored in design practices. This study, rooted in a descriptive qualitative approach, seeks to address this oversight. Conducted at Redpot Indonesia, a leader in promotional design, the research focuses on crafting modular furniture designs that harmonize functionality with branding and psychological needs. Central to the study's objective is the creation of workspaces that not only facilitate social interaction and cooperative learning but also resonate with employees' mental well-being. The research's methodology triangulates data from literature reviews, observational studies, and structured interviews. In doing so, it aims to offer an enriched perspective on office design, emphasizing a more holistic approach to workspace configurations.

KEYWORDS

Furniture Innovation, Ergonomics, Psychological

1. Introduction

Numerous stakeholders, primarily interior consultants and designers, have dedicated efforts to refine the proposal process of interior design concepts within office environments. These professionals persistently assess and enhance a variety of design concepts to align with the distinctive characteristics of end-users in specific spaces. Presently, the adaptation of the interior production system to the prevailing design philosophy is frequently guided by the preferences of the space occupants. This approach is rooted in the principle that optimal design production encompasses a comprehensive engagement with all five senses and addresses the ergonomic needs of the human body. Such a holistic approach significantly influences the exploration of the environment and the ambiance of the surrounding space, thereby fostering a more active and harmonious work ethic among office employees in accordance with their respective roles and activities.

User-centered design incorporates the psychology of the employees using the space, facilitating personal interaction to enhance work quality. The design and selection of office facilities and furniture are critical components, significantly influencing a company's success in raising client awareness. Additionally, the strategic integration of suitable interior design and furniture selection can elevate work quality (Campos et al., 2018; Papanek & Fuller, 1972).

Emphasizing the pivotal role the office environment, on the other hand, plays in determining employee success and underscoring the need for innovation in transitioning from traditional to modern design paradigms. These alterations transform office facilities into stimulating spaces, encouraging employees to be proactive, independent, and accountable (Munandar, 2001).

Munandar suggests that such transformations can be achieved by diversifying desk chair facilities, enhancing flexibility, and communication amongst office workers. In addressing the challenges of desk chair design with an emphasis on active learning, researchers draw upon a range of studies and secondary data. These include research on ergonomic work chairs (Ani & Azid, 2022; Suryono, 2012), desks and seating facilities in offices (Nurkertamanda et al., 2006; Purwaningrum et al., 2015), seating facilities (Zainudin et al., 2018), and rattan furniture (Saputro, 2012). The focus of this study is to redesign seating facilities or office chairs, incorporating Active Learning principles. The research narrows down its scope to the product design of seating facilities pertinent to Active Learning, employing a modular design concept.

2. Method

In this study, a descriptive qualitative approach is employed to delve deeply into the intricacies of office furniture design, specifically focusing on desk chairs, with the research predominantly situated within the confines of Redpot Indonesia's Jakarta Office. This setting offers a unique vantage point, providing real-world context to the research theme. Data collection employs a trifold strategy: a rigorous literature review pulls from an array of academic sources, from books and peer-reviewed journals to prior studies on desk chair advancements; on-site observations furnish firsthand insights into furniture usability and aesthetic dynamics; and structured interviews with both office workers and administrative staff capture experiential nuances, offering a layered understanding of user satisfaction and design utility. Ensuring the reliability of the collected data, a triangulation technique cross-references information from varied sources, strengthening the study's validity. The data is bifurcated into primary, sourced directly from observational and interview sessions, and secondary, derived from a wealth of academic references. Conclusively, furniture designs undergo a meticulous evaluation, scrutinizing their effectiveness, functionality, aesthetics, and the overarching user experience they engender.

3. Results and discussion

Observations conducted across various office spaces highlighted discrepancies in the models of conventional seating facilities in accommodating employee activities. These disparities underscore the need for innovation, driving the evolution of traditional seating facilities into a system characterized by modular furniture design (Dąbrowska-Żółtak et al., 2021). A fundamental consideration in this innovation is the avoidance of non-ergonomic chair designs, a common issue observed in most existing models, resulting in diminished user comfort.

The persistent use of such non-ergonomic chairs manifests several consequences. Firstly, a seat pan of insufficient length exerts pressure on the mid-thigh, leading to discomfort. Secondly, an overly long or wide seat pan induces pressure at the junction of the calves and thighs, particularly in the knee folds, resulting in discomfort. Thirdly, a seat pan that is excessively narrow induces leg fatigue, causing a tendency to lean back and consequentially, exerting pressure on the lumbar region. Lastly, an elevated seat pan height results in undue pressure on the soles of the feet.

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Pendhapa
Vol. 14., No. 1, June 2023, pp. 44 - 53

Addressing these ergonomic challenges is crucial, as they significantly influence the comfort and well-being of employees, ultimately impacting their productivity and overall workplace experience (Kroemer, 2017; Miller, 2022). Thus, a comprehensive approach to redesigning seating facilities, focusing on ergonomic principles and modular design, is paramount.

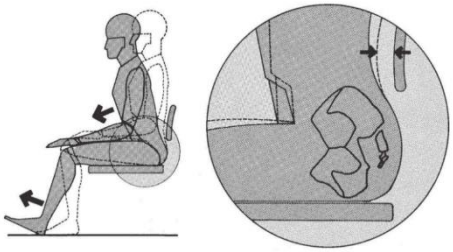

Figure 1. The seat pan too short (De Chiara et al., 1991).

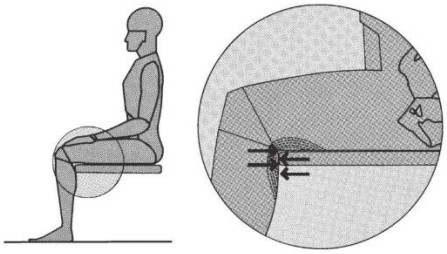

Figure 2. The seat pan too long/wide (De Chiara et al., 1991)

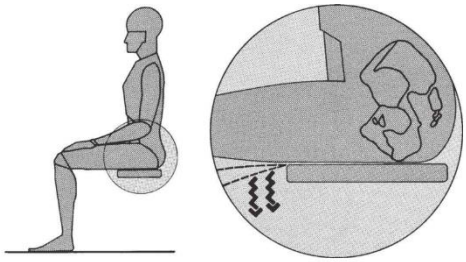

Figure 3. The seat pan too narrow (De Chiara et al., 1991)

Taking into account the findings related to ergonomic deficiencies, the researchers embarked on devising alternative chair designs that are relevant and accommodating to work activities grounded in the concept of dynamic work. The cornerstone of crafting such table product designs is to address and alleviate issues of discomfort, hence, the pursuit is towards achieving a design that harmonizes comfort with functional seating facilities. The inception of the design process necessitates a meticulous phase of design that involves measuring the height posture of office workers. The consideration of the workers' weight is methodically addressed by adopting standards proposed by Harpenden Caliper (Papetti et al., 2020). From the culmination of the aforementioned analysis, it emerges that a design adhering to a modular system is deemed apt for desk chair facilities.

Modularity in design signifies an approach that segments a system into smaller, independent units referred to as modules, which can be interchangeably utilized across various systems. Modularity implies the attribute of being easily movable and predominantly existing as standalone entities in the form of separable modules (Ye & Lau, 2022). This modular approach in the design of seating facilities aims to enhance adaptability, flexibility, and customization to meet the diverse

needs and preferences of office workers, thereby fostering an environment conducive to dynamic work.

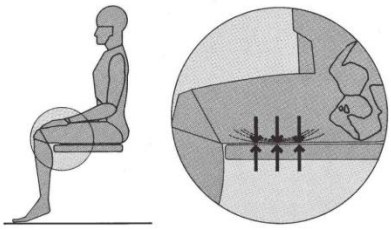

Figure 4. The seat pan too high (De Chiara et al., 1991)

The fundamental aim of crafting desks and seating facilities is to facilitate office workers in executing efficient work through engaging in a variety of independent work activities, fostering discussions and social interactions with colleagues, and transitioning from a traditional work model to a dynamic work process. The underlying working principle of the modular system involves segmenting the overall system into independent modules that can subsequently be employed within diverse systems.

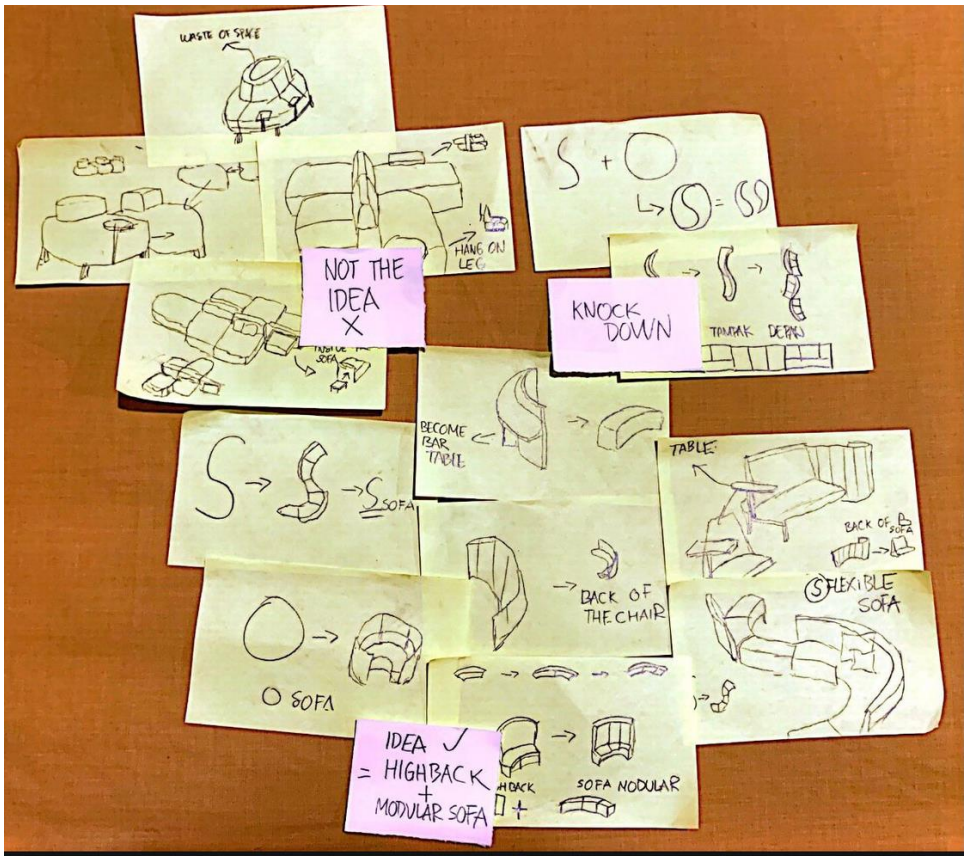

Figure 5. Conceptualization of Design Ideas for Desk Chair Facilities

This study dissected, scrutinized, and selected the modules for desks and chairs, isolating elements that did not align with the designated design criteria. Both observational and bibliographic data were meticulously analyzed to ascertain the convergence point between the two, with the aim of refining discordant design elements and ensuring optimal design solutions are achieved. This comprehensive approach enables the adaptation and customization of workspace

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Pendhapa
Vol. 14., No. 1, June 2023, pp. 44 - 53

furniture, ensuring it aligns with the evolving dynamics and demands of contemporary office environments.

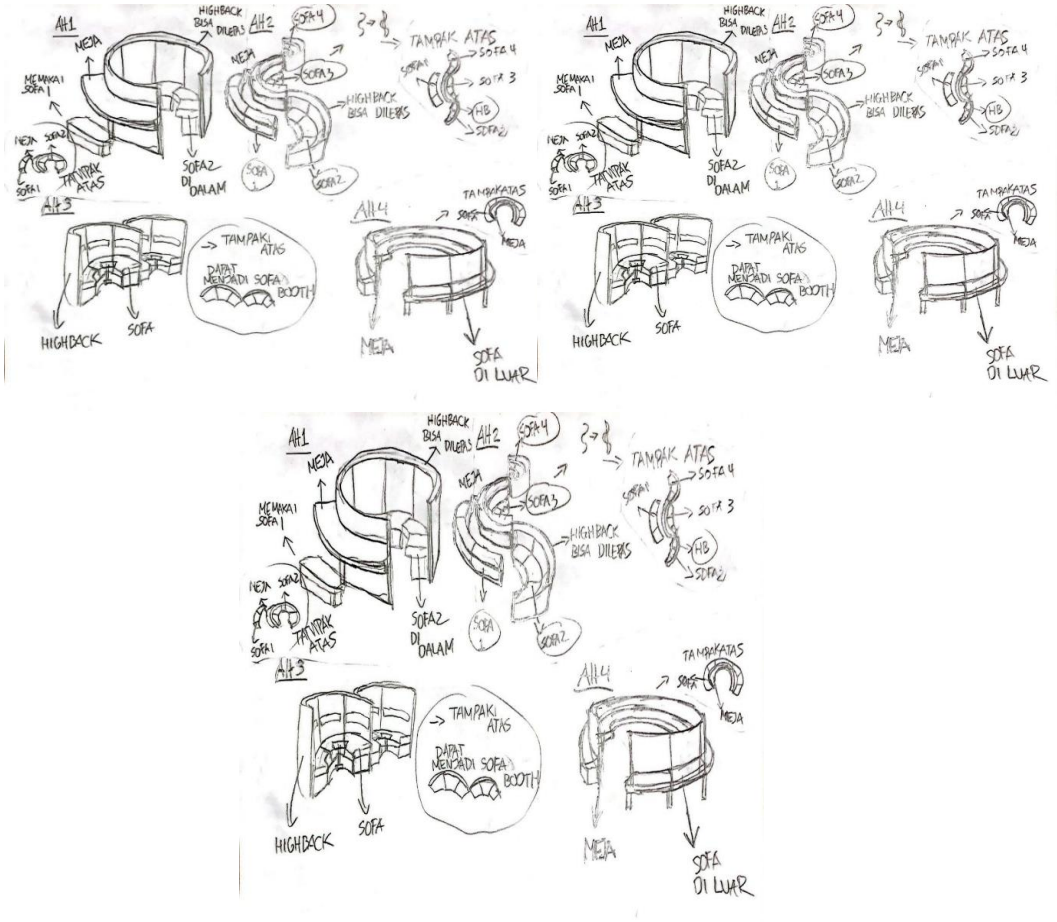

Figure 6. Alternative design informed by the configuration of the seat's backrest side, employing a modular design concept.

Figure 6 illustrates a sketch showcasing innovations in the design of office workers' desk and seating facilities derived from several modular system designs. The incorporation of ergonomic and functional chairs is posited to address previously identified issues, thereby optimizing the enactment of active learning practices. During the finishing stage, the furniture may incorporate specialized materials utilizing water-based thinners, ensuring safety for the users. A dynamic color palette and comfortable fabric material are selected for the final touches, aiming to stimulate work dynamics and foster a sense of camaraderie among office workers, contributing to a more natural and comfortable workplace atmosphere.

The design process and the eventual realization of the desks and chairs facilities take into account several factors relating to the environmental and cultural conditions of the office workers. These factors, which hold aesthetic, economic, functional, and technical significance, substantially influence the visual elements of the desks and seating facilities. This influence is evident in the application of materials, construction, dimensions, form, and color. The methodological steps in developing the design concept for desks and seating facilities are expected to yield two distinct categories: ergonomic and functional, in accordance with the cluster and U models. Thus, in evaluating the quality of the resulting desk chair design, several characteristics emerge as determinants of the design concept outcomes.

Table 1. Cataloging the Comfort Requirements of Desk Chair Facilities

Table	Chair
Lightweight	Lightweight
Sturdy and capable of bearing weight	Sturdy and capable of bearing weight
Equipped with a bag hanger and easy to move	Easy to move
Table dimensions according to anthropometry	Chair dimensions according to anthropometry
It can be arranged into other forms	It can be set into other forms
Compact packaging with seats	Compact packaging with desk
Facilitate the production process with a cantilever-shape	Facilitate the production process with a cantilever-shape

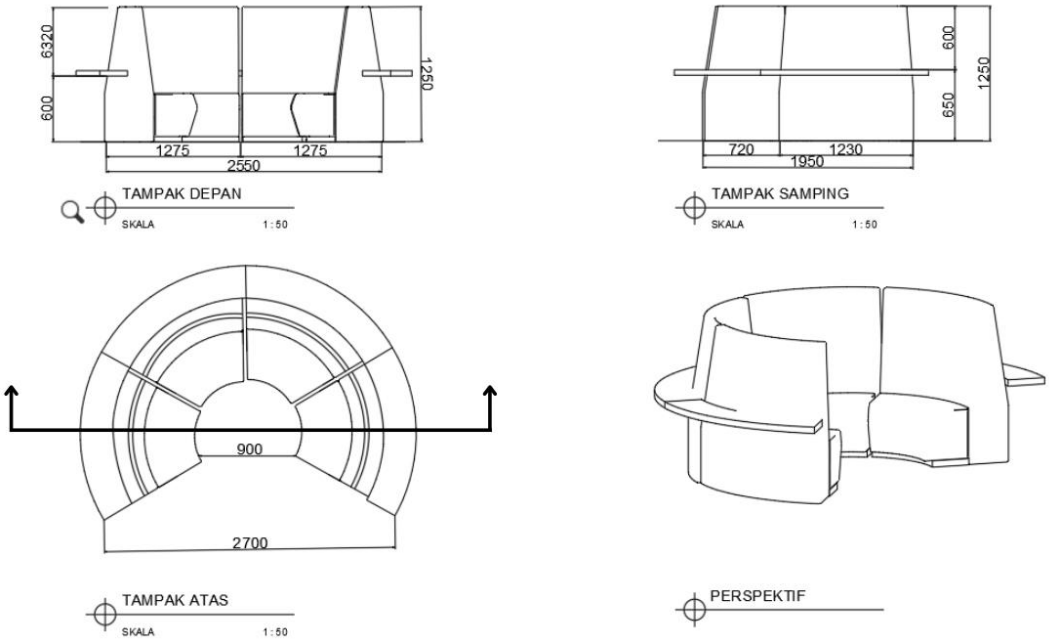

Figure 7. Work Drawing of Desk and Chair Aligning with Functional and Design Specifications

Figure 8.

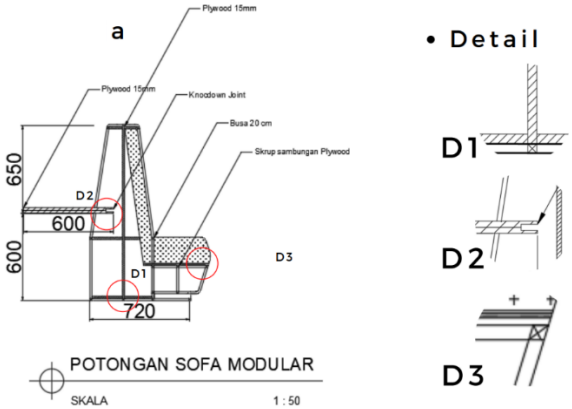

Figure 9. Work Drawing of Desks and Chairs, Showcasing Visual Elements of Furniture and Construction Details.

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Vol. 14., No. 1, June 2023, pp. 44 - 53

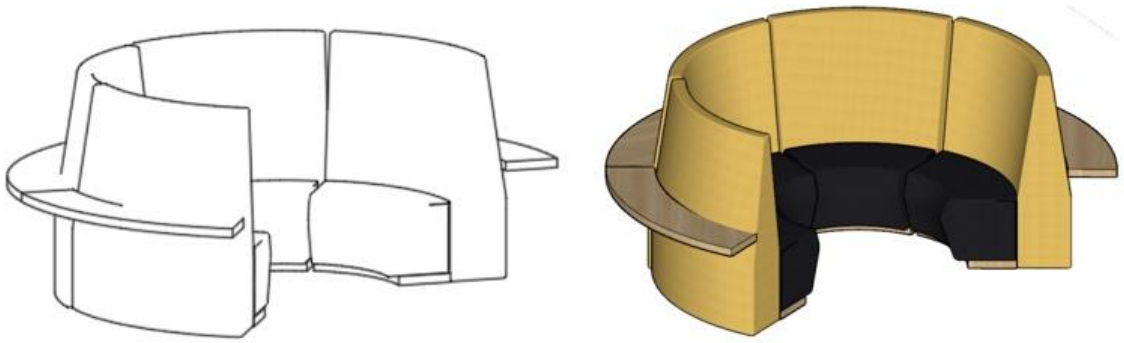

Figure 10. 3D Illustration of Modular Desk Chair Design

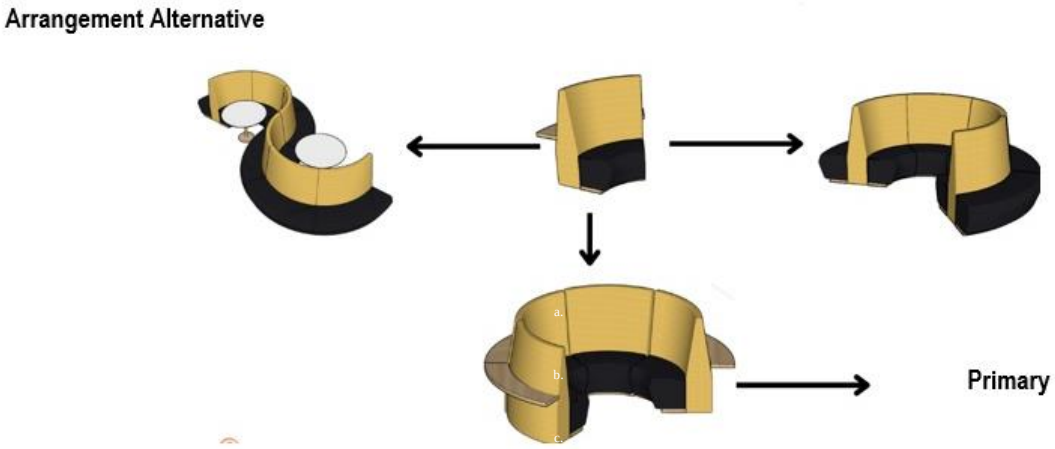

Figure 11. 3D Illustration of Desks and Chairs Showcasing Various Modular Systems.

Figure 12. 3D Illustration of Modular Desks and Seats Arranged in an Office Space

The findings indicate that utilizing desk chair facilities adhering to conventional furniture design systems may compromise comfort, particularly when implementing concepts conducive to active learning. The prevalence of immobile or difficult-to-move desk and chair facilities can hinder a dynamic work process, subsequently impacting employee productivity. By integrating a modular concept into the design of desk chair facilities, the result yields ergonomic and functional furniture, compliant with both cluster models and U shapes. This facilitates mobility and supports active learning systems.

The principle of modular furniture design is categorized into three main components: efficiency, effectiveness, and performance (Hinchman, 2022). This principle is a comprehensive concept associated with the precise utilization of an object's function, the applicability of the design in daily life, maximization of material usage, and the capability of the designed modules to support the daily activities of the users. The innovation in furniture design is highly contingent on the defined objectives and criteria for modular furniture.

It is essential that each design undergoes rigorous testing and evaluation to ensure the fulfillment of ergonomic standards. The availability of specific analyses or detailed information regarding specialized modular furniture designs would be advantageous. Several fundamental principles and components integrated into a modular furniture system applying sitting ergonomics in the office include:

- Ergonomic Chairs: These are furnished with features such as adjustable back support aligning with the spine's natural curvature, neck and head support, and an angled seat to maintain natural sitting posture and alleviate thigh pressure.
- Ergonomic Desks: These desks support optimal sitting posture, equipped with features like adjustable height, ample legroom, and adjustable keyboard trays for maintaining a neutral wrist position.
- Monitor Positioning: Ensuring computer monitors are at eye level prevents users from straining their necks and backs. The utilization of monitor stands or adjustable screen heights can facilitate optimal positioning.
- Modularity: Modular furniture systems enable users to customize furniture arrangements, offering flexibility in creating configurations tailored to individual needs.
- Supportive Materials: Selecting appropriately firm materials for chairs and cushions can enhance user comfort.
- Posture Awareness Features: Integrating reminders or warnings into the furniture systems can encourage users to periodically adjust their sitting positions.
- User Training: Despite the ergonomic design of the furniture system, user training is pivotal for the correct setup and utilization of the equipment to maximize ergonomic benefits.

This approach to modular furniture design, emphasizing sitting ergonomics, aims to mitigate bodily stress and fatigue, while enhancing employee productivity and overall well-being (Gómez-Carmona et al., 2019). The analysis of such innovative designs should be meticulously conducted, ensuring alignment with set goals and criteria, and guaranteeing adherence to ergonomic principles. Further, the availability of detailed analyses and information on specific modular furniture designs would undoubtedly enrich the evaluation process and outcome.

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Pendhapa
Vol. 14., No. 1, June 2023, pp. 44 - 53

4. Conclusion.

Upon analyzing the outcomes of the study, multiple conclusions have been deduced regarding the usage of desk chair facilities following conventional systems while implementing representative concepts for active learning.

1. Lack of Comfort: Traditional systems of desk and seating facility designs might overlook the significance of ergonomic considerations. Consequently, employing these facilities during active learning, which necessitates mobility and diverse sitting positions, may result in discomfort. Extended periods of sitting can manifest in physical discomfort and health complications, such as muscle tension, back issues, and fatigue. The efficacy of active learning strategies that advocate for proactive participation can be diminished if conventional desks and seating do not permit adequate movement.
2. Movement Restrictions: The rigidity of conventional designs can inhibit user movement and adaptability in embracing active learning methodologies. Facilities that lack adjustability for the positions essential for innovative and interactive activities can impede both productivity and active participation. The design rigidity of conventional systems may curtail the ease and flexibility necessary for implementing physically interactive and engaging active learning approaches.
3. Lack of Ergonomic Support: Traditional furniture designs might fall short in offering optimal support for user posture and comfort during active learning, potentially resulting in physical distress, discomfort, and a decline in productivity.
4. Limited Interaction: In the implementation of representative concepts, the interaction amongst coworkers and collaborative-supporting facilities is pivotal. However, conventional desks and seating may hinder optimal collaboration, as they are not specifically designed to facilitate this interaction.
5. Lack of Flexibility: Conventional designs often feature fixed settings and lack the flexibility needed to cater to diverse learning or working styles. This rigidity can pose a challenge in implementing representative concepts in active learning that necessitate accommodating individual variations.
6. Potential Reduction in Creativity: The emphasis of active learning on engagement, creativity, and participation can be constrained by furniture that is not ergonomic or fails to support a variety of postures, thereby limiting creativity and involvement in learning or working processes.
7. The Importance of Adjustments: Making appropriate adjustments to desks and seating facilities is crucial for effectively applying representative concepts in active learning. Although conventional systems might not be inherently designed for this, with the right modifications, they can be optimized to uphold the principles of active learning.

In summary, the study underscores the necessity of ergonomic support, as conventional furniture designs may inadequately support user posture and comfort during active learning, which can culminate in physical discomfort and a decrease in productivity.

5. References

1) Ani, M. N. C., & Azid, I. A. (2022). An Integration of Statistical and Anthropometric Measurement Approach Towards Improving Ergonomic Design for Production Workbench. *Malaysian Journal of Medicine & Health Sciences*, *18*.
2) Campos, P., Ehrenberg, N., & Campos, M. (2018). Designing Interactions with Furniture: Towards Multi-Sensorial Interaction Design Processes for Interactive Furniture. *ArXiv Preprint ArXiv:1803.01145*.

3) Dąbrowska-Żółtak, K., Wojtowicz, J., & Wrona, S. (2021). Reconfigurable neighborhood—Mechatronisation of the urban design. *Sustainability*, *13*(24), 13547.
4) De Chiara, J., Panero, J., & Zelnik, M. (1991). Time-saver standards for interior design and space planning. *(No Title)*.
5) Gómez-Carmona, O., Sádaba, J., & Casado-Mansilla, D. (2019). Enhancing street-level interactions in smart cities through interactive and modular furniture. *Journal of Ambient Intelligence and Humanized Computing*, 1–14.
6) Hinchman, M. (2022). *The Fairchild Books Dictionary of Interior Design* (4th ed.). Bloomsbury Publishing Inc. https://doi.org/10.5040/9781501365171
7) Kroemer, K. H. (2017). *Ergonomic design for material handling systems*. CRC Press.
8) Miller, G. (2022). Human Impacts on Work Design. In *Ergonomic Insights* (pp. 1–12). CRC Press.
9) Munandar, A. S. (2001). *Psikologi industri dan organisasi*.
10) Nurkertamanda, D., Saptadi, S., & Herviyani, D. D. (2006). Perancangan meja dan kursi anak menggunakan metode Quality Function Deployment (QFD) dengan pendekatan Athropometri dan bentuk fisik anak. *J@ Ti Undip: Jurnal Teknik Industri*, *1*(1), 10–17.
11) Papanek, V., & Fuller, R. B. (1972). *Design for the real world*.
12) Papetti, A., Gregori, F., Pandolfi, M., Peruzzini, M., & Germani, M. (2020). A method to improve workers' well-being toward human-centered connected factories. *Journal of Computational Design and Engineering*, *7*(5), 630–643.
13) Purwaningrum, L., Funatsu, K., Xiong, J., Rosyidi, C. N., & Muraki, S. (2015). Effect of furniture weight on carrying, lifting, and turning of chairs and desks among elementary school children. *PloS One*, *10*(6), e0128843.
14) Saputro, F. W. (2012). *Perancangan Kursi dan Meja Ruang Tamu Berbasis Kearifan Lokal dengan Metode Kansei Engineering dalam Upaya Peningkatan Nilai Ekonomis Produk Rotan di Desa Trangsan*.
15) Suryono, E. (2012). *Rancangan Kursi Kerja Berbasis Ergonomi Untuk Mengurangi Kelelahan Pada Pekerja Pelinting Rokok Di Pt Djitoe Indonesia Tobacco Tahun 2012*.
16) Ye, Y., & Lau, K. H. (2022). Competitive green supply chain transformation with dynamic capabilities—An exploratory case study of Chinese electronics industry. *Sustainability*, *14*(14), 8640.
17) Zainudin, A., Widayat, R., & Purwantoro, A. (2018). Desain meja dan kursi sistem modular berbasis active learning untuk siswa sekolah dasar. *Productum: Jurnal Desain Produk (Pengetahuan Dan Perancangan Produk)*, *3*(3), 107–112.