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Experiencing ChatGPT for Interpersonal Communication Practice: A Case Study of Communication Students Perspective

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ABSTRACT

Discussion on the latest technology features has reached the usage of Artificial Intelligence (AI) accessible online through services provided by OpenAI, particularly ChatGPT (Generative Pre-trained Transformer). ChatGPT offers various features capable of answering various commands with relatively fast response times. These features include various topics including interpersonal communication. This research aims to observe and compare the knowledge and answers provided by ChatGPT with the knowledge of the Communication Science students of State University of Surabaya, regarding Interpersonal Communication course through SANRA (a scale for the quality assessment of narrative articles) instrument. The results of this study are expected to provide insights and the latest knowledge about the use of ChatGPT features in Communication Science studies, as well as to give an overview of the opportunities and challenges that will be faced in the students' academic achievement, especially in higher education.

INTRODUCTION

The dynamic of digital communication today, the sophisticated tools such as text-based conversational artificial intelligences has signaled a paradigm shift in how interpersonal communication is approached and studied. ChatGPT, for example, has emerged as a crucial point in this transition. It offers not merely a platform for casual interaction but potentially serving as a critical educational asset in the field of communication studies. The academic discourse about the integration of artificial intelligence in communication studies is growing yet remains in promising stages. However, it needs empirical experiences and perceptions from the communication students regarding its contextual understanding.

This study endeavors to fill this gap in literature by presenting a case study focused on the utilization of ChatGPT tool in describing interpersonal communication course from the vantage point of communication students and from the ChatGPT point of view. Several studies have observed the journey of ChatGPT used in some circum-stances. Scholars, like Rudolph & Tan (2023) expressed concerns about the model's task assessment in the scope of higher education systems. On contrary, Alshater (2022) questioned the comparison of articles generated by ChatGPT. These discussions had already been studied by Zhai (2022) to project the benefits of ChatGPT for academic development. And then Kasneci, E. et al. (2023) conducted a study that considered the prospects and challenges of the future after the emergence of ChatGPT.

Surprisingly, the features of ChatGPT have surpassed various other online services in terms of user acquisition. For instance, Twitter took two years to gain one million users and Facebook required ten months to reach the same milestone. However, ChatGPT

achieved one million users within just five days since its initial release in November 2022. Moreover, the usage trends of ChatGPT have expanded across various disciplines. It is being used in fields such as educational research (Gao, et al., 2022), healthcare and clinical settings (Vaishya & Vaish, 2023), entrepreneurship (Short & Short, 2023), finance (Dowling & Lucey, 2023), and marketing (Jain, Subash, & Mogaji, 2023). Regarding those capabilities, its implementations are more likely to become a chatbot on some applications, websites, and smartphone applications services (OpenAI, 2023). Thus, researchers are interested in conducting study and observation which focused on the use of ChatGPT in higher education, particularly concerning contemporary educational issues on Interpersonal Communication.

Research related to the use of Artificial Intelligence features has become increasing-ly common, especially in late 2022 and early 2023. At the end of November 2022, a research institute in San Francisco, United States, released an Artificial Intelligence facility under the name OpenAI. This facility offers natural language processing that can respond to commands and questions entered online through the OpenAI website. Various research studies have highlighted that this facility provides quick and en-gaging results by being able to answer a variety of questions on different topics.

By observing the works of ChatGPT it can be understood that this feature is capable of processing written questions and providing structured responses. It can even re-member previous questions, ensuring that each answer remains relevant. Setiawan & Luthfiyani (2023) have experimented with the ChatGPT feature and found that generating around 693 words for a specific topic command only takes about seven minutes. This finding is interesting since such a short duration can advance tasks like writing or summarizing.

Aydın & Karaarslan (2022) observed ChatGPT's ability to process and generate lit-erature study papers on health. Their observations revealed that ChatGPT's answers are relatively lacking in rewording, leading to a relatively high level of plagiarism. Alshater (2022) then attempted to explore the positive side of this language processing technology's development. In their research, they found that ChatGPT sup-ports research capacity enhancement across various fields of study, including general knowledge, economics, and finance. While the technology still has weaknesses in ethical considerations, contextual understanding, and originality, Alshater de-tailed that ChatGPT's features in economics and finance are capable of processing information such as accuracy improvement steps, financial report compilation, real-time market analysis, consumer habit identification, and projecting future risks and gains.

Zhai (2022) observed that the positive trend of ChatGPT's presence could also im-pact the education sector, particularly in the learning and learning evaluation processes. In their research, Zhai found that ChatGPT is highly competent in composing academic articles according to given keywords and instructions, requiring minimal human intervention for improvement. By March 2023, ChatGPT was claimed to generate responses exceeding 25,000 words in a single command. Therefore, based on various scholarly approaches, this research aims to observe the depth of ChatGPT's discussion on Interpersonal

Communication topics from the perspective of students in the Communication Science program.

RESEARCH METHOD

This study aims to observe and analyze the outcomes of using ChatGPT by students of the Communication Science program at Universitas Negeri Surabaya in relation to discussions within Interpersonal Communication courses. Specifically, the study seeks to compare the depth of answers provided by ChatGPT with the material presented in lectures. Therefore, the results of this research can be developed as considerations for enhancing the values imparted in classroom learning by examining the strengths and weaknesses generated by ChatGPT. Based on this description, the research is intended to understand the responses and answers resulting from ChatGPT usage, analyze the key points mentioned by ChatGPT regarding Interpersonal Communication, and discuss them based on relevant literature reviews.

In the initial phase, the research will be conducted by selecting a group of students to experiment with ChatGPT on various topics. The results of the experiment will then be analyzed by a reviewer using SANRA instruments to process data and classify the total points of articles made by students and articles made by ChatGPT. The data will be analyzed through various concepts and theories offered in studies of Interpersonal Communication. Subsequently, the research findings and data from recent studies will be further analyzed to identify key points related to Interpersonal Communication especially on certain topics as follows 1) Definition of Interpersonal Communication, 2) The Importance of Interpersonal Communication, 3) Ways to Become a Good Listener, 4) Ways to Maintain Interpersonal Relationships, 5) Strategies to Manage Emotions and Interpersonal Conflicts, 6) Managing Interpersonal Communication within Families, 7) Establishing and Managing Interpersonal Communication in the Digital and Internet World, and 8) Perspectives and Hopes for Interpersonal Communication in the Future.

RESULTS AND DISCUSSION

On the first attempt, a group of students are required to answer eight questions regarding key topics in Interpersonal Communication course. They have to answer in their best writings for questions 1 to 8 like 1) Definition of Interpersonal Communication, 2) The Importance of Interpersonal Communication, 3) Ways to Become a Good Listener, 4) Ways to Maintain Interpersonal Relationships, 5) Strategies to Manage Emotions and Interpersonal Conflicts, 6) Managing Interpersonal Communication within Families, 7) Establishing and Managing Interpersonal Communication in the Digital and Internet World, and 8) Perspectives and Hopes for Interpersonal Communication in the Future.

Table 1. Comparison of Students and ChatGPT by SANRA Instruments.

No	Items	Articles Score	
		#1	#2
1	**Justification of the article's importance for the readership**	1	2
	0 -> The importance is not justified		
	1 -> The importance is alluded to, but not explicitly justified		
	2 -> The importance is explicitly justified		
2	**Statement of concrete aims or formulation of questions**	2	2
	0 -> No aims or questions are formulated		
	1 -> Aims are formulated generally but not concretely or in terms of clear questions		
	2 -> One or more concrete aims or questions are formulated		
3	**Description of the literature search**	0	1
	0 -> The search strategy is not presented		
	1 -> The literature search is described briefly		
	2 -> The literature search is described in detail, including search terms and inclusion criteria		
4	**Referencing**	0	1
	0 -> Key statements are not supported by references		
	1 -> The referencing of key statements is inconsistent		
	2 -> Key statements are supported by references		
5	**Scientific reasoning**	1	2
	0 -> The article's point is not based on appropriate arguments		
	1 -> Appropriate evidence is introduced selectively		
	2 -> Appropriate evidence is generally present		
6	**Appropriate presentation of data**	0	0
	0 -> Data are presented inadequately		
	1 -> Data are often not presented in the most appropriate way		
	2 -> Relevant outcome data are generally presented appropriately		
	Total Scores	4	8

The analysis of each article reveals distinct strengths and weaknesses. In the case of the articles created by students, the focus on introducing the concepts of two-way communication and interpersonal communication is apparent. However, a critical drawback is the lack of explicit justification for their importance to the readership. The text primarily aims to explain these communication forms and their associated goals, such as message exchange, sharing thoughts, and achieving objectives. Unfortunately, the absence of a literature search strategy and details about consulted sources weakens the overall credibility. Additionally, the lack of references to support key statements leaves the concepts introduced without substantial backing. The text could significantly benefit from the inclusion of more empirical evidence and references to bolster its arguments.

Conversely, the analysis of the article generated by ChatGPT showcases a more comprehensive approach. The text underscores the significance of interpersonal communication by elucidating its roles in relationship dynamics, conflict resolution, decision-making, and collaboration across personal, social, and professional realms. The article outlines the aims and components of interpersonal communication, covering verbal and nonverbal means. While the text provides a solid overview, it falls short in detailing the extent of the literature search, search terms, and inclusion criteria. Similarly, specific references to support key statements are lacking. Despite these drawbacks, the article excels in logical reasoning, effectively explaining how interpersonal communication functions through various means and emphasizing its role in different aspects of life. However, the absence of quantitative or qualitative data limits the article's empirical support. Overall, the text successfully communicates the concept of interpersonal communication and its implications but could enhance its credibility by incorporating more specific references and data presentation.

The first article introduces the concept of two-way communication and interpersonal communication but lacks explicit justification for their importance. It presents goals and aspects of interpersonal communication but lacks references, data presentation, and detailed scientific reasoning. And the second article, on the other hand, more thoroughly explores interpersonal communication. It explicitly justifies its im-portance and presents its goals comprehensively. It describes the literature search briefly and introduces evidence to support its points, albeit with some inconsistencies in referencing. Both articles lack data presentation. Thus, the first article which is made by students introduces the concepts but lacks in-depth support and detailed presentation of the topic. While the second article which is made by ChatGPT pro-vides a more detailed and well-rounded analysis of interpersonal communication, covering its importance, aims, context, and aspects, though improvements can be made in referencing.

Therefore, based on the findings, the researchers suggest that students could enhance their work by providing more context and explaining the reasons why the concepts of two-way communication and interpersonal communication are significant in various contexts. And of course, they need to pay attention to adding credible references to academic sources. Then they have to provide relevant statistics, case studies, or examples to illustrate the concepts of Interpersonal Communication. Whereas for ChatGPT-Generated Article, it has to cite from cross-reference like some established academic sources to ensure accuracy and credibility. The collaboration of these two attempts will somehow strengthen the quality on comprehensive and accurate analysis aspects. On certain condition as to exercise on writings analysis, students can use the content from the ChatGPT-generated article as a starting point and then enhance it by providing the necessary justification, references, and specific examples. This experience provides students with the opportunity to critically assess AI-generated content, identify its strengths and limitations, and contribute their expertise to enhance the content.

CONCLUSION

Through the discussion, the analysis of the two articles, one authored by students and the other generated by ChatGPT, highlights distinct strengths and weaknesses in their respective approaches to discussing two-way communication and interpersonal communication. The student-created article introduces the concepts but lacks explicit justification, detailed presentation, and credible references. On the other hand, the ChatGPT-generated article provides a more comprehensive analysis, emphasizing the significance of interpersonal communication across various realms. However, it falls short in detailing the literature search and lacks specific references and empirical data.

To improve student-authored work, it is recommended to provide more context, explain the significance of concepts, and incorporate credible references along with relevant statistics, case studies, or examples. Meanwhile, the ChatGPT-generated article could enhance its credibility by citing from established academic sources for cross-referencing accuracy. The collaborative approach of using the ChatGPT-generated article as a starting point and then strengthening it with student input can lead to a more comprehensive and accurate analysis. This process allows students to critically assess AI-generated content, identify strengths and limitations, and contribute their expertise to enhance overall content quality. In conclusion, the combined efforts of AI-generated content and human input can result in a more robust and nuanced analysis of interpersonal communication.

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The Language Style of PKK Women in Promoting Telang Tea as the Main Product of the Karangbong Community

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ABSTRACT

Language is a medium for communication that is used to convey information to the interlocutor in the form of letters, words, punctuation marks, and sentences. In a language, there is a style of language that is used to beautify a sentence like the people of Karangbong, especially PKK women, who use metaphorical language to promote Telang Herbal Tea (TETEH) through Instagram. The metaphor style is to compare something without using conjunctions as a comparison. In this case, it can be interpreted that the metaphor has a figurative meaning or not the actual meaning. Therefore, this article aims to find out the language styled by PKK Karangbong Village women in promoting Telang products and promotions on e-commerce platforms. The method used in this article is qualitative with a descriptive-analytic approach. The research subjects were PKK mothers in Karangbong Village. The research material object is TETEH product packaging and TETEH product advertisements on the account @pkmpm.healthteamom, while the formal object is language style and function. The type of data in this study is meaningful data in the form of words, phrases, and sentences that reflect the types and meanings of the figurate language contained on the TETEH product packaging and the Instagram account @pkmpm.healthteamom. The source of this research data is secondary data – techniques used in collecting data with documentation, reading, and rerecording.

INTRODUCTION

As a medium for communication, language is a means of conveying messages or information to the interlocutor which is mutually agreed upon in the form of symbols [1], [2]. One of the ways to convey a language, the symbols or symbols used are in the form of letters, words, punctuation marks, and sentences [3]. According to Chaer [4] states that the function of language is a system of sound symbols that are arbitrary to interact and identify themselves. Good Indonesian is a language that is appropriate to the situation and conditions and is effective in conveying intentions to the other person. Meanwhile, correct Indonesian is Indonesian according to the rules of the standard language [5].

Indonesian is open and capable of developing and carrying out their function as a means of communication in modern society [6]. In this modern era, many people are starting to express themselves and communicate through social media. One of them is used to promote the product to be sold. The urgency of using language style is to heed language so that it looks attractive and has a special meaning in it. Keraf [7]states that in conveying messages or information, everyone has a different style of language. Crafts in [8] argues that language style is based on sentence structure: "The structure of sentence pieces can be used as the basis for creating language style. In language studies, there is a study of language style which is principally influenced by the form and type used [9].

According to Tarigan [10] reveals that language style is a form of rhetoric, namely the use of words spoken and written to persuade or influence listeners and readers. In the use of

language, styles can use a variety of language styles. The variety of language styles varies greatly, one of which is often used in promoting a product, namely metaphorical language style. The style of metaphor is to compare something without using conjunctions as a comparison, Rahayu [11]. In line with Keraf's opinion, metaphors have a very simple structure, that is, there is something to talk about and there is something to compare, Keraf in [12] mentions that the structure of the metaphor is very simple, that is, there is something to talk about, and there is something to compare it to.

According to Ganie in [11] figure of speech or figurative language is a beautiful language used to enhance the effect by introducing and comparing an object or certain things with other objects or things that are more common. Metaphors are the same as similes that have a resemblance to an analogy that is usually used to promote a product. Promoting a product, especially on social media, must be interesting. Not only in terms of packaging, but the diction that is structured to attract consumers is also very important. The use of metaphorical language styles used to promote herbal Telang tea is used more variedly. As is the case with Aminuddin's opinion in Anisa [13] who argues that language style or style is a way to present ideas according to the goals to be achieved used by the author.

One of the communities that use metaphorical language style when promoting is the community of PKK Al-Mubarokah mothers in Karangbong Village. The Al-Mubarokah PKK mothers aim to use this metaphorical style of language to express thoughts through diction in the promotion of TETEH Telang Herbal Tea products. This is supported by Keraf's opinion in [14] which reveals that the better the style of language used, the better people's evaluation of it, as well as the worse someone uses the style of language, the worse the assessment given.

The TETEH product is a superior product from Karangbong Village because it is cultivated directly by PKK Al-Mubarokah mothers in Karangbong Village. In addition, the use of metaphors aims to attract readers' attention to superior products promoted on Instagram. Sabino in [15] revealed that in Instagram media you can directly use effects to adjust photo coloring as you wish and creativity so that in the process of promotion on Instagram social media, the words used are in the form of parables that are not true meanings. Therefore, as for some of the problem formulations contained in this article, (1) what is the metaphorical language style of Karangbong Village PKK women promoting telling tea products?, (2) what is the metaphorical language style of Karangbong Village PKK mothers promoting on the platform e-commerce? For this reason, this article aims to find out the style of language used by PKK Karangbong Village mothers in promoting Telang tea products and promotions on e-commerce platforms. Analysis of language styles in product promotion by PKK Al-Mubarokah women is very important to be researched and studied in more depth to know and understand the pattern of people's language styles in promoting their superior products. In addition, it can be used as material for other similar research knowledge related to the topic of language style in product promotion on Instagram social media.

RESEARCH METHOD

This research is qualitative research with a descriptive-analytic approach. The research material object is TETEH product packaging and TETEH product advertisements on the account @pkmpm.healthteamom, while the formal object is language style and function. Data collection was carried out using digital ethnographic methods to examine product promotions [16]. The type of data in this study is meaningful data in the form of words, phrases, and sentences that reflect the types and meanings of the figurative language contained on TETEH product packaging and the Instagram account @pkmpm.healthteamom. The source of this research data is in the form of secondary data, namely data obtained indirectly from the source, namely words or sentences contained in the TETEH product packaging and the Instagram account @pkmpm.healthteamom.

Techniques used in collecting data with documentation, reading, and recording. Documentation techniques are used to document the TETEH product and then analyze the figurative language of the metaphor. Meanwhile, the reading and note-taking technique is reading product promotion posts, but the Instagram account @pkmpm.healthteamom carefully and repeatedly. Reading and note-taking techniques are used to gain a deep understanding of the data studied.

RESULTS AND DISCUSSION

Based on the results of the analysis, there is one sentence containing a metaphor on the TETEH product packaging and six sentences containing a figurative language style. This can be seen in Table 3.1 below:

Table 3.1. The results of sentence analysis on TETEH product promotion

No	Sentences	Metaphor
1	In Indonesia: *"**Teman**i pagimu **cerahkan** suasana"* In English: "Friend your morning brightens the atmosphere"	*"Temani"* *"Cerahkan"*
2	In Indonesia: *"Segarnya **bukan kaleng-kaleng**"* In English: "Fresh not canned"	*"bukan kaleng-kaleng"*
3	In Indonesia: *"Jangan **pandang sebelah mata**, kesehatan yang utama"* In English: "Don't look down on your eyes, health is the main thing"	*"pandang sebelah mata"*

4	In Indonesia: *"**Biru** Enak! **Ungu** Enak!"* In English: "Delicious Blue! Delicious Purple"	*"Biru"* *"Ungu"*
5	In Indonesia: *"Khasiatnya **juara**"* In English: "Benefits of great"	*"Juara"*
6	In Indonesia: *"**Tanggal tua** semakin membuat lelah?"* In English: "Old date makes you tired?"	*"Tanggal tua"*
7	In Indonesia: *"Harga **ramah kantong**, kualitas tidak remeh"* In English: "Pocket-friendly prices, quality is not trivial"	*"Ramah kantong"*

Based on the classification in Table 3.1, the following is a discussion regarding the style of metaphor used by PKK Al-Mubarokah women to promote TETEH products.

3.1 Metaphoric Language Style on TETEH Packaging

Most food or beverage products have a tagline in the form of a short sentence that characterizes a product. Taglines are useful so that consumers can easily remember products from a portion of food or drink. TETEH also has a tagline on its packaging. The tagline is in the form of a one-line sentence containing a figure-of-speech metaphor. This can be seen from the following discussion:

In Ind. "*Temani pagimu cerahkan suasana*"

In Eng. "*Friend your morning brightens the atmosphere*"

The word "friend" according to KBBI is a person who has long been known and is often related in certain matters, so the word friend can be interpreted as accompanying,

accompanying, and accompanying. The context of "friend" in this case is human. However, in this ad, the word "friend" is a metaphor because the TETEH product is analogous to being a friend for consumers in the morning, even though TETEH is a non-human product, as the meaning of a real friend refers to people. In addition, the phrase brightens the mood is a metaphor because the word "bright" in the sentence does not mean clear/bright but serves as an analogy that consuming TETEH can calm the mind and nourish the body so that the day you go through becomes enjoyable.

3.2 Metaphoric Language Style in Promotions on Instagram @pkmpm.healthteamom

The TETEH product advertisement that is displayed on Instagram @pkmpm.healthteamom as a form of beverage advertisement, displays images of TETEH products that have been brewed in the form of herbal teas. In the picture, there is a tagline that contains a figure-of-speech metaphor. This metaphor can be seen from the following data:

(1) *Segarnya **bukan kaleng-kaleng** (in Ind.)*
"Fresh not canned" (in Eng)

https://www.instagram.com/p/CvOph6jvEDi/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA==

The word "*kaleng*" according to KBBI is tin-plated thin iron. However, in the advertisement, the word "*kaleng*" does not refer to thin metal, but contains figurative language. "*bukan kaleng-kaleng*" refers to the freshness produced by eggplant tea, so it can be interpreted that the freshness produced from eggplant tea is of good quality and not just random.

(2) *Jangan **pandang sebelah mata**, kesehatan yang utama (in Ind)*
"Don't look down on your eyes, health is the main thing" (in Eng)

https://www.instagram.com/p/CvTwmGgvlGN/?utm_source=ig_web_copy_link&igsh id=MzRlODBiNWFlZA==

As a herbal product, the tagline of the TETEH product promotion also contains a message about health. The message is conveyed through a short sentence full of meaning which is beautified by inserting a figure of speech to make it seem more beautiful. "*pandang sebelah mata*" in the advertisement contains figurative language because what is meant does not mean looking at something using only one eye, but means belittling. So, the purpose of the sentence from the ad is not to underestimate health because health is the main thing in life.

(3) ***Biru*** *enak!,* ***Ungu*** *enak! (in Ind)*
Delicious Blue! Delicious Purple! (in Eng)

https://www.instagram.com/p/CvTwjdSvJxf/?utm_source=ig_web_copy_link&igshid =MzRlODBiNWFlZA==

"Biru" and "ungu" are colors, according to KBBI color is the impression that the eye gets from the light reflected by the objects it hits. In a real sense, color relates to the sense of sight, namely the eyes. However, in the advertisement, color is associated with the sense of taste. This is influenced by the word 'delicious' which represents the sense of taste. The

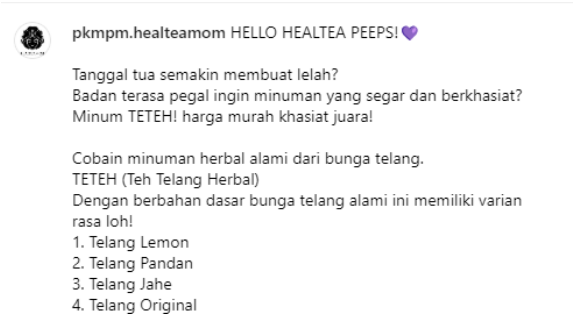
sentence in the ad is said to contain a metaphorical figure of speech because it uses color to represent the sense of taste. The blue and purple colors are called delicious because the TETEH product turns blue or purple when brewed. The color that appears on TETEH depends on the resulting flavor variant. Therefore, they are called "biru enak", and "ungu enak" because whatever color appears TEACH still tastes good.

(4) *Khasiatnya **Juara** (in Ind)*
Benefits of great (in Eng)

https://www.instagram.com/p/CvTwpcQP-Hv/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA==

The word "*juara*" in the tagline contains a metaphor because it considers TETEH's efficacy as a champion. According to KBBI, the great or champion is the person or team that won the last game. However, in the context of this sentence, the "great" is the efficacy of TETEH because it is made from herbal ingredients and contains compounds that can be used for health.

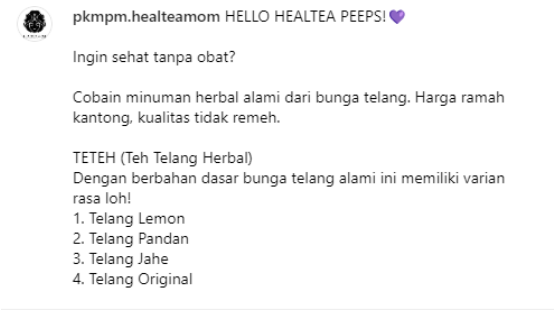
(5) ***Tanggal tua** semakin membuat lelah? (in Ind)*
Old date makes you tired?" (in Eng)



https://www.instagram.com/p/CvTwpcQP-Hv/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA==

The "*tanggal tua*" contained in the Instagram caption in product promotions like the picture above is a sentence that contains figurative language used as a simile when it's at the end of the month. At that time, some people were saving money, so the point of the advertisement was that TETEH products had affordable prices for all people.

(6) *Harga **ramah kantong**, kualitas tidak remeh (in Ind)*
Pocket-friendly prices, quality is not trivial (in Eng)



https://www.instagram.com/p/CvOph6jvEDi/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA==

The "pocket-friendly" written on the Instagram caption contains a figurative language style because the word is interpreted as a cheap price. By installing this tagline, the advertiser intends to convey a message that means that the price of TETEH is cheap and can be purchased by any group of people.

CONCLUSION

Based on the results of the study, the style of language in the form of a figure of speech was found in the advertising campaign carried out by the Karangbong Village PKK. The style of language is in the form of a metaphorical figure of speech which is used as a tagline and caption in promotional activities. The use of figurative language metaphor aims to attract the reader's attention to the superior product being promoted. So in the process of promotion on Instagram social media, the words used are in the form of parables that are not the real meaning. This can be seen from the metaphorical sentences in Instagram posts such as Friends your morning, brighten the atmosphere; Fresh, not canned; Don't look down on your eyes, health comes first; Delicious Blue! Delicious Purple; Benefits of great; Old date makes you tired?; and Pocket-friendly prices, quality is not trivial. The tagline is found on the packaging, as well as advertising posts for TETEH products. By using the style of language used by Mrs. PKK to promote a product, aims to attract the attention of consumers. The tagline contained in this packaging design contains words that attract attention and provide consumers with the benefits of consuming TETEH.

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Audio-Augmented Reality Musical Braille Pop Up Book as a Music Learning Media for the Visual Impairment Children's Self-Development

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Keywords:
Music
visual impairment
special needs
braille

ABSTRACT

The objectives of this research are: (1) to describe the development process of "Audio-Augmented Reality Musical Braille Pop Up Book"; (2) Analyzing the quality of "Audio-Augmented Reality Musical Braille Pop Up Book" based on comments from Braille symbol experts, music teachers, or music practitioners; and (3) Proving the effectiveness of "Audio-Augmented Reality Musical Braille Pop Up Book" in the self-development of blind children. This research has this priority, namely as a supporter of one aspect of the Sustainable Development Goals, namely the aspect of "quality education", where through "Audio-Augmented Reality Musical Braille Pop Up Book" it is hoped that it can become a source of learning and self-development for children. blind, so they can learn independently. The theory applied in the Student Creativity Program Research is the theory of Tomlinson's teaching materials. Tomlinson (Yoga, 2020) suggests that: (1) Teaching materials must have an impact, (2) Teaching materials must make students feel easy, (3) Teaching materials must make students develop self-confidence, and (4) What is taught must be visualized. The method used in preparing this product is the ADDIE Model. The product "Audio-Augmented Reality Musical Braille Pop Up Book" is the first and opening step for blind students towards independence in opening their horizons, especially in the realm of music. By understanding and being able to apply the concepts of Braille music notation, they will have the opportunity to explore their musical interests and express their soul. With the hope, in the end they will be able to produce musical works that can be heard and enjoyed by the wider community. Thus, music activities through the application of Braille music notation for blind students are not only a medium of entertainment, but also a bridge for their work to be accepted globally.

INTRODUCTION

The implementation of educational services for disabled people (especially in Indonesia) cannot be said to be good. There are still obstacles in its implementation, for example, the lack of educational facilities and infrastructure. The disabled referred to in this proposal are the blind. Blindness is the condition of someone who experiences disturbances or obstacles in their sense of sight (Wardani in Saputri, 2013). As stated by Puspitasari and Azeharie (2019), that blind students not only need to get academic education, but also non-academic education, so that the potential of these students can develop optimally. Based on a preliminary study conducted at a school for the blind or visually impaired, namely at the Special Needs School - A "YPAB" Surabaya, the main obstacle in learning Cultural Arts (Music) is that the delivery of material is also still done verbally, which is difficult for students to study independently.

Problems from a psychological standpoint at Special Needs School - A "YPAB" Surabaya, there are still many blind children who experience low self-esteem, lack of self-confidence, which causes them to find it difficult to interact with their surroundings, especially when with people who are classified as 'normal' people. Due to a lack of self-

confidence, this also results in their abilities and talents, especially in the realm of music, not being explored optimally. One of the factors is in the art of music learning material books, especially those that can be used as handbooks for blind students. The music lesson is useful for growing students' self-confidence levels and making students' mental health good. Good mental health will affect the improvement of student learning outcomes and achievements (Jazuli, 2020). This was also emphasized in the literature study on data from several sources, including: Data from the official website of the Mitra Netra Foundation, as a non-profit organization that focuses its activities on efforts to improve the quality and participation of the blind in the field of education and employment (this institution has the status of a legal entity registered with Supplement to the State Gazette dated 14/12 of 2001 number 100), in collaboration with the Indonesian Braille Electronic Community.

The phenomenon of reading Braille among blind students that occurs at this time has begun to decrease. The reason is that there is an assistive technology called "Screen Reader" with the function of playing gadgets without having to look at them. According to Sulistyowati and Rafi (2020) a screen reader or software that is useful for helping blind people use a computer. Not only on computers, Screen Reader is also available on smartphones that are integrated with the Android Accessibility Suite system which requires Android version 6 or later. The benefits of this system can help the blind to use smartphone devices. In order to be read through the system, this book is made in an e-book version which can later be scanned via a QR Code. Besides that, science and technology can also affect children's interest and enthusiasm for learning, for example, the use of Audio-Augmented Reality technology which can provide an interesting audio-visual display. The basic assumption of this research is the creation of a book that helps the process of learning the art of music that is flexible in nature which can be used by special needs school institutions for the blind at a certain level and can be widely used by blind people in need. Thus, the need for learning facilities for blind students will be optimally supported.

Music learning is an effective method for instilling national character in blind children (Maskuri in Ramadhan, 2018). Based on the results of the data study obtained by the researcher, the researcher conducted social humanities research to compile a learning material book that can be used independently by blind students entitled " Audio-Augmented Reality Musical Braille Pop Up Book as a Music Learning Media for the Visual Impairment Children’s Self-Development" It is explained in the book regarding the development of learning the keyboard instrument for blind students. In a music notation reading system, symbols, not letters, are used that represent pitch, duration, key, volume, and other elements as important information; where for musicians who are blind, they are constrained to digest the symbol, therefore music scoring needs to be transcribed into Braille music notation (Jacko, et al, 2015). The book contains material for songs to be played on a keyboard instrument, which is applied through a combination of song melodies and basic chords.

This book is in the context of cultural arts, where in one book there are several types of folk songs from representatives of several provinces in Indonesia, with the aim of providing insight into introducing the richness of Indonesian culture, one of which is the wealth of regional songs. The Braille music notation reading system has dimensions that are not integrated with ordinary inkprint reading. Because blind people cannot see and absorb music with long phrases, they must read and store each phrase in their minds, one by one (Herlein in Cunha, 2021). The book also aims to facilitate independent music learning, achieve the cognitive domain according to the Basic Competency of Special Needs Schools, students can "read and hear" song notations using their senses of hearing and touch. Apart from that, from the psychomotor domain, students can directly apply the folk song notations to the keyboard skillfully.

Student Creativity Program Activities – Humanities Social Research can also support the achievement of Main Performance Indicators of State Universities, namely attainment of indicator 1 (alumni getting decent jobs or entrepreneurship); indicator 2 (students get experience off campus); indicator 3 (lecturers have activities outside the campus); and indicator 5 (the results of the lecturer's work are used by the community) where students and lecturers collaborate to make a real contribution in the field, in this case related to learning the music for blind children. Apart from that, this activity also supports the implementation of the Merdeka Belajar - Kampus Merdeka program to develop potential reasoning and skills in the fields of education and music outside the campus.

The objectives of this research are: (1) to describe the development process of "Audio-Augmented Reality Musical Braille Pop Up Book"; (2) Analyzing the quality of "Audio-Augmented Reality Musical Braille Pop Up Book" based on comments from Braille symbol experts, music teachers, or music practitioners; and (3) Proving the effectiveness of "Audio-Augmented Reality Musical Braille Pop Up Book" in the self-development of blind children. This research has this priority, namely as a supporter of one aspect of the Sustainable Development Goals, namely the aspect of "quality education", where through "Audio-Augmented Reality Musical Braille Pop Up Book" it is hoped that it can become a source of learning and self-development for children. blind, so they can learn independently.

The product "Audio-Augmented Reality Musical Braille Pop Up Book" is expected to contribute to the development of science, namely to develop learning tools for blind children, especially in the scientific field of music arts. It is hoped that this product can also become a reference for practitioners or teachers of music arts in developing similar learning resources for the needs of blind children. In addition, self-learning which is facilitated through the provision of the "Audio-Augmented Reality Musical Braille Pop Up Book" also supports the Merdeka Belajar – Kampus Merdeka program launched by the Ministry of Education, Culture, Research and Technology.

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children, especially in the scientific realm of music. It is hoped that this product can also become a reference for music practitioners or music teachers in developing similar learning resources for the needs of blind children.

RESEARCH METHOD

The type of research carried out is development research that is intentional, systematic which aims to seek, find, formulate, improve, develop, produce, test the effectiveness of products, models, methods/strategies, services, certain procedures that are superior, new, effective, efficient, productive, and meaningful (Putra, 2015). The intended development is the preparation of the Audio-Augmented Reality Musical Braille Pop Up Book. The method used in preparing this product is the ADDIE Model. Prawiradilaga (2015) states that the ADDIE Model is a learning design based on a systems approach. The components contained in the ADDIE Model include: (1) Analyze: includes an analysis of material needs and the needs of students; (2) Design (design): scope of designing competency formulation, strategy; (3) Develop (develop): includes the development of teaching materials, as well as media development; (4) Implement: includes face-to-face meetings and assessments; and (5) Evaluate (assess): in terms of evaluating learning and improvement programs.

Figure 1. ADDIE Model Reiser Version.

By applying the ADDIE model, this research will start from the phases of analysis, design, development, and so on, so that a detailed, targeted, and effective songbook development product will be produced, especially for blind students.

Research data was collected starting from data about the initial conditions of the music learning process at the research location, from the initial analysis stage to the development stage, as well as data regarding the validation results from the validators about the quality of the song material book that had been developed. The validator will test the quality of the resulting book in terms of various aspects, starting from the packaging of the book (regarding the book's cover page, composition, clarity of Braille

symbols) and regarding the contents of the book (composition/grammar, stages of compiling song material). Research data was collected through several methods, including: (1) Through observation at the research location; (2) Collecting data during the book validation process in the form of analysis data on the validity of product development instruments; (3) Research data was also obtained when testing the effectiveness of product development, namely in the form of data from student activities observations as well as results of interviews with music teachers and students after using this book during the learning process of Music Lesson.

RESULTS AND DISCUSSION

The preparation of "Audio-Augmented Reality Musical Braille Pop Up Book", the concept of implementing the ADDIE Model can be explained as follows:

1. **Analyze**

   In this phase, the researcher conducted preliminary research from several sources regarding the phenomena that occurred factually in the field, namely related to the absence of a songbook that contained regional (Nusantara) songs using Braille music notation to be applied to keyboard instruments. In addition, so that students can easily recognize their musical instruments without having to buy or touch them directly, there is a pop-up book feature. Then, so that this book is also interactive and also adds enthusiasm to student learning, the latest feature, Audio-Augmented Reality, is added to the songs section. Apart from the physical form, this book will also be made into an e-book version so that it can be read through a screen reader.In this phase, the researcher conducted preliminary research from several sources regarding the phenomena that occurred factually in the field, namely related to the absence of a songbook that contained regional (Nusantara) songs using Braille music notation to be applied to keyboard instruments. In addition, so that students can easily recognize their musical instruments without having to buy or touch them directly, there is a pop-up book feature. Then, so that this book is also interactive and also adds enthusiasm to student learning, the latest feature, Audio-Augmented Reality, is added to the songs section. Apart from the physical form, this book will also be made into an e-book version so that it can be read through a screen reader.

   This research refers to the learning needs of students of Special Needs Elementary School (Blind) - A for 6th grade, semester one. The Competency Standards and Basic Competences that serve as a reference in the preparation of research products, namely Competency Standards: 2. Appreciate the process of creating music based on ideas about themes, symbols, techniques, and how to present them. Basic Competency: (2.1.) Comparing various regional music; (2.2.) Describe the experience of listening to various Indonesian and foreign music; (2.3.) Playing rhythmic and melodic musical instruments; and (2.4.) Singing regional and foreign songs with musical instruments.

2. Design

After analyzing the needs that are evident in the field, the researcher designs a product (in this case a book) that describes the basic technical material for playing the keyboard instrument, in detail, gradually, and easily understood by blind students at the age of around 10-14 years . Next, the selection of materials for finger practice songs, regional songs, and adjustments to the use of accompaniment chords from predetermined songs is carried out. Braille musical notation uses the standard Braille points used by the visually impaired to read and write music; in a sense, they use the same Braille points as they use in reading and writing (Goto in Park and Kim, 2014). In addition, Braille music notation reading provides all the information on the printed page of the music, includes notation values, dynamics instructions, and expression signs, and fingering number instructions, where all of this information must be placed on one line that can be easily touched by the fingers (Goldstein in Abramo and Pierce, 2013). Considerations which are used in the preparation of the "Audio-Augmented Reality Musical Braille Pop Up Book" there are several points, including: (1) Tone spacing or intervals; (2) rhythmic beats and musical notation rates; (3) Song material; (4) Song material is arranged sequentially, starting from 3 notation, 4 notation, 5 notation, and 6 notation, and also (5) Selection of regional songs (Indonesian songs). In compiling the "Audio-Augmented Reality Musical Braille Pop Up Book", the material is organized into several chapters, including: (1) Chapter 1: Getting to Know Braille Keyboard Instruments and Musical Notation; (2) Chapter 2: Initial Fingering Exercises; and (3) Chapter 3: Practicing Nusantara (Folklore) Songs.

3. Development

In this phase, a rough draft of "Audio-Augmented Reality Musical Braille Pop Up Book" was created, which had been written in Braille musical notation, and then printed into a physical Braille book using Art Carton A3 paper with various thicknesses.

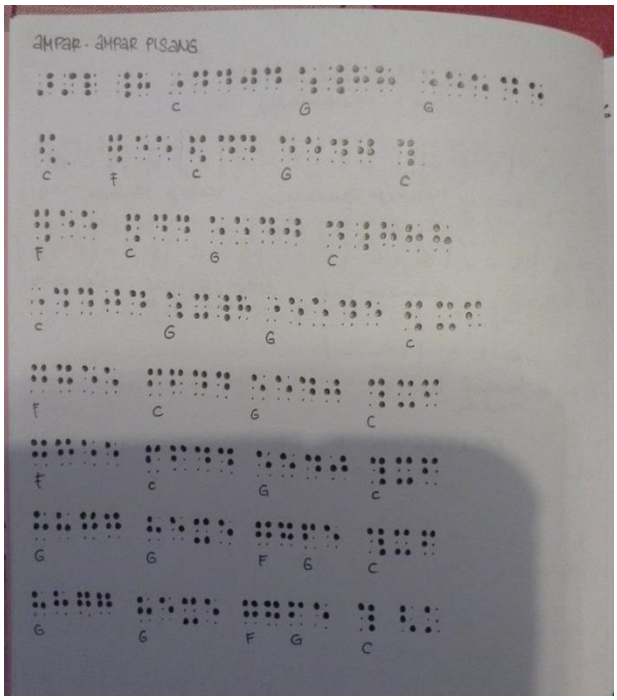

Figure 2. An example of composing song material using Braille music notation.

Then, the stage is continued with writing Braille characters on the skin of the book using MibiBraille 4th series software, in which the software has 5 (five) types of character sizes, namely size 14 (very small), 16 (small), 18 (medium/normal), 20 (large), and size 22 (very large). For this book, a character size of 18 is used, which belongs to the normal/medium category which aims to make the distance between the 6 (six) Braille dots in each character not too tight and not too far apart so that students' fingers become comfortable when feeling Braille characters and make it easier for students to in the process of reading titles, sub-chapters, and other information on the skin of the book. Book production uses the Braillo Norway Model 200 Series II electronic printer. This tool supports the book production process, starting from the typing stage to the printing stage so that quality physical condition book products can be produced.

After that, the draft of this book was submitted to the validator team to be tested from a quality perspective, to the graphic feasibility aspect that was adjusted to the Indonesian National Education Standards Agency. The validator team consists of parties who are competent in the field of Braille and Music. The quality of the product development "Audio-Augmented Reality Musical Braille Pop Up Book" is broken down into 4 (four) components, namely the feasibility of content, presentation feasibility, language feasibility, and graphic feasibility. Based on the results of the combined validation carried out by music practitioners, arts and culture teachers, Braille music notation experts, as well as teachers of blind students at Special Needs Schools, the components of Content Eligibility, Presentation Adequacy, Language

Eligibility and Graphic Feasibility are in the category of Very Good and Very Valid results.

4. Implementation and Evaluation

The product was tested directly on the students of the Special Needs School-A "YPAB" Surabaya regarding the effectiveness of the product. The effectiveness of using the product "Audio-Augmented Reality Musical Braille Pop Up Book" can be measured from each activity carried out by students during the Music learning activity. Starting from the activity of reading theoretical material in chapter 1 on the introduction of keyboard instruments and Braille music notation. Cognitively, students are directed to get to know keyboard instruments globally and types of Braille musical notation on simple beats (C1 cognitive domain). After that, students are able to recall the types of notes they have read with their sense of touch independently (C1 cognitive domain). Not only knowing and remembering, students are also able to understand the concepts and functions of Braille music notation when it is used in a song (C2 cognitive domain). Thus, students can independently apply the concept of Braille music notation in the form of simple songs, where students can read the melody of a simple song listed in the product "Audio-Augmented Reality Musical Braille Pop Up Book". This means, the level of the students' cognitive domain increases to the application stage (C3 cognitive domain).

Moving on to the next student activity, which is trying to play a simple melody of a song that has been read on a keyboard instrument. In this activity, what is developed in students is their psychomotor domain, namely at the Skilled Movements (P5) level - movements that require a learning process (Arikunto, 2009). At the level of this psychomotor domain, students are able to apply their understanding of the concept of Braille music notation into concrete actions, namely playing the song on a keyboard instrument with the correct notes position, the right beat, and the use of the correct accompaniment base chords as well.

Apart from being based on Bloom's taxonomy analysis and the results of the percentage of observations of student activity during Music learning activities, the effectiveness of using the product "Audio-Augmented Reality Musical Braille Pop Up Book" can also be shown from the opinions of students and teachers, during and after the product trial process takes place. Based on the results of interviews with several Musical teachers (the teacher is also blind), it was stated that the procurement of the product "Audio-Augmented Reality Musical Braille Pop Up Book" is very beneficial for the process of improving students' skills and skills, where the skills in playing music are expected to be used as provision for students for social and economic existence in society.

CONCLUSION

The product “Audio-Augmented Reality Musical Braille Pop Up Book” is the first and opening step for blind students towards independence in opening their horizons,

especially in the realm of music. By understanding and being able to apply the concepts of Braille music notation, they will have the opportunity to explore their musical interests and express their soul. With the hope, in the end they will be able to produce musical works that can be heard and enjoyed by the wider community. Thus, music activities through the application of Braille music notation for blind students are not only a medium of entertainment, but also a bridge for their work to be accepted globally.

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Innovative Product Development from LDPE Waste using the Fusing Interlock Technique: A Material Driven Design Study Case

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product design,
material driven design,
plastic waste

ABSTRACT

In response to the escalating plastic waste issue in Indonesia, intensified by a lack of public knowledge on waste management, this research focuses on repurposing LDPE plastic waste collected from laundry service using the plastic fusing interlock technique. Employing a material-driven design method with research through design approach where design process is used as method of inquiry, exploring and investigating research questions through the creation of tangible prototypes from the LDPE plastic waste. The study identifies suitable recycling techniques for LDPE waste and assesses its feasibility in creating functional products. Through five experimental trials, the research establishes that layer-by-layer fusion is the most effective method, and cutting the fused plastic with a pond knife yields strong and versatile results. The interlocking modules produced through this technique provide flexibility for diverse configurations, offering myriad possibilities for product creation. The study concludes that the fusing interlock technique makes LDPE waste repurposing accessible and cost-effective, eliminating size limitations and enhancing product durability. The experiments utilized approximately 450 sheets of LDPE plastics, showcasing the potential for sustainable production and contributing to SDG 12: Responsible Consumption and Production.

INTRODUCTION

Plastic is often found in our daily lives. Due to its lightweight, waterproof, and inexpensive nature, plastic is used as a raw material in nearly all disposable items and packaging. However, despite its advantages and convenience, plastic waste has become an environmental issue due to its difficulty in decomposing. According to data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK), in 2022, the volume of waste generated in Indonesia reached 19.45 million tons. This represents a decrease of 37.52% compared to 2021, which reached 31.13 million tons. In terms of the types of waste, the majority of the national waste volume in 2022 was food waste, contributing as much as 41.55%. Plastic waste ranked second with a proportion of 18.55% [1]. Thus, creative ways are needed to manage plastic waste.

One way to address plastic waste is through upcycling, which involves repurposing waste into new products. However, upcycling alone is not enough to reduce plastic waste. As designers, the concept of circular design also needs to be considered. Circular design is an approach in design aimed at creating products and services that are durable, reusable, repairable, and recyclable, resulting in zero waste to support a sustainable economy [2]. This involves early thinking during the design phase about potential product improvements, how products can be enhanced, and the environmental impact of the products [3]. The goal is to create products designed with sustainability and circularity principles, ensuring efficient resource use, waste reduction, and extending product lifespan through repairs, updates, and recycling (Ratum et al., 2019). Referring to Circular Design and Economics by the Ellen MacArthur Foundation, some strategies that can be applied are dematerialization and modular design. Dematerialization focuses

on reducing dependence on physical materials by offering digital alternatives or reducing the use of new materials. This approach minimizes resource consumption as much as possible and reduces waste by providing digital services rather than producing physical products.

Modular design involves creating products consisting of replaceable and upgradable modules. This allows users to easily replace or upgrade specific components of the product rather than replacing the entire product [4]. Modular design promotes longer lifespans, repairs, and reduces overall environmental impact by extending product lifespan and reducing the amount of waste generated [5].

In addition to circular design, there is the concept of Material Driven Design (MDD), an approach in design that emphasizes the role of material as the center of creativity in the design process [6]. This concept was introduced by Elvin Karana and encourages designers to not only see materials as tools to realize existing design ideas but also as the main source of inspiration in creating new design ideas. In this approach, designers open themselves up to experiments with material characteristics such as texture, color, and strength, allowing the material to shape the form and function of the product. MDD aims to create more sustainable, efficient, and innovative designs by thoroughly understanding the characteristics of the materials used. This approach also encourages the use of environmentally friendly materials and creativity in the design process.

By combining the principles of dematerialization and modular design implemented in the MDD stages, it is hoped that designers can contribute to more sustainable practices and reduce the environmental footprint of products throughout their lifecycle.

The primary objective of this study is to propose a standardized operating procedure for the utilization of LDPE waste collected from laundry services, incorporating circular design principles and the Material Driven Design (MDD) approach to achieve the SDG 12 goal responsible consumption and production. The specific research objectives are as follows:

1. To investigate the principles of circular design, exploring strategies of dematerialization and modularization.
2. To explore and understand the Material Driven Design (MDD) method, which focuses on utilizing material properties and characteristics to inform the design process.
3. To implement circular design principles, specifically dematerialization and modularization, in the utilization of LDPE waste with the plastic fusing interlock technique through the research process guided by MDD.
4. To recommend a standard operating procedure for the effective utilization of LDPE waste, employing the plastic fusing interlock technique.

By achieving these objectives, the study aims to contribute to the development of sustainable practices in utilizing LDPE waste and promoting circularity in design and material utilization.

LITERATURE REVIEW

To help the study achieve the responsible consumption and production, the SDG 12 goal

[7]. The study adopts circular design and material driven design approach. MDD, as developed by [6], prioritizes sustainable practices by placing the material at the forefront of the design process, considering not only its functional attributes but also its potential to evoke meaningful user experiences. This methodology aligns with SDG 12 by promoting a comprehensive understanding of the material's properties, fostering minimal waste, and ensuring efficient resource utilization. On the other hand, Circular Design, rooted in circular economy principles, emphasizes repairability, upgradability, and minimizing environmental impact during the design phase [8]. The combination of MDD and Circular Design promotes responsible production by encouraging tangible interaction with materials, fostering longevity, and considering end-of-life scenarios.

Circular Design

According to the Ellen MacArthur Foundation, design is a deliberate creation, encompassing the way we create products, services, and systems. It is the process through which a designer shapes materials into desired forms and mechanisms. Design involves considerations not only about the physical appearance, but also crucial decisions made throughout the design process, such as production processes and how the product will be used. Circular design, the inaugural phase in the circular economy, is embedded within this process. Circular design comprises four stages: 1) Understand - focusing on comprehending user characteristics and system understanding, 2) Define - articulating the design and the designer's intentions in words, 3) Make - generating ideas, designing, and creating multiple prototypes through iteration, renewal, and improvement, and 4) Release - launching the design and building user loyalty.

Figure 1. Circular Design
Source: [8]

It is essential to understand that circular design extends beyond considerations of repairing and reproducing products; it necessitates forward-thinking during the initial design phase about product repairability, potential upgrades, and environmental impact. Designers must grasp how their products are used and anticipate their longevity. Although achieving a product with zero waste may be challenging, designing products with extended lifespans, utilizing appropriate materials, and prioritizing product quality is achievable. By incorporating circular design principles, designers can reassess the manufacturing process and enhance production systems, thereby making meaningful contributions to society and the environment. Strategies to implement circular design include opting for safe and circular materials, avoiding substances harmful to humans and the environment. Other effective approaches involve dematerialization, addressing

problems with minimal material use, such as offering digital services and utilizing reusable containers. Additionally, modular design allows users to easily upgrade and repair products, reducing repair costs by addressing only the damaged part. Circular design, therefore, emerges as a comprehensive strategy for sustainable and responsible product development.

Material Driven Design

Material Driven Design (MDD) is a sustainable design methodology developed by [6] that prioritizes the material as the central driver of the design process. It goes beyond functional considerations to encompass the material's unique properties, engineering limitations, and its potential to elicit meaningful user experiences. MDD is distinguished by its comprehensive approach, focusing on both the tangible and sensorial qualities of the material. The method encourages hands-on interaction with the material from the initial encounter, enabling designers to explore and comprehend its distinctive characteristics. Importantly, MDD extends beyond utilitarian assessments to envision and materialize design intentions, aiming to create new product concepts that deliver innovative and engaging material experiences.

The Material Driven Design (MDD) method comprises four key steps to guide its implementation. Firstly, the method emphasizes understanding the material by delving into its unique properties, sensorial qualities, and potential meanings. This involves technical characterization, where designers learn about the material's mechanical and technical properties, and experiential characterization, focusing on sensorial, interpretative, affective, and performative aspects. The second step involves creating a material experience vision, where designers formulate a comprehensive vision statement expressing the material's role in creating functional superiority and a unique user experience. Material benchmarking is conducted to gain insights from other materials, informing the vision. The third step, Manifesting Material Experience Patterns, entails visualizing and categorizing datasets to identify patterns and formulate material experience patterns. The final step is designing material/product concepts by integrating findings from the previous steps. Through these steps, MDD facilitates a holistic approach to material-driven design, guiding designers in creating meaningful and sustainable product experiences.

After conducting a literature review, the research aims to bridge the gap between material-driven design and circular design studies by integrating them into a single framework that guides designers in sustainable design. Hence, the research question is: How do we implement the material-driven design and circular design framework in the design process?

METHODS

The current study utilized a qualitative exploratory research design, employing the research-through-design (RtD) approach to examine the implementation of Material Driven Design (MDD) and Circular Design within a design project. RtD, as a research approach, integrates design practices and methodologies to tackle intricate problems and generate novel knowledge [9]. It entails employing the design process itself as a method of inquiry, delving into and addressing research questions through the development of

tangible artifacts, prototypes, or interventions [10]. Unlike conventional research methods that predominantly rely on analysis and observation, RtD underscores the act of designing as a means to comprehend, explore, and contribute to knowledge across various domains, encompassing design, architecture, and human-computer interaction.

The research methodology involved a multi-step process. The research uses the material driven design method which consists of four stages: Understanding the material, creating material experience vision, manifesting materials experience patterns, designing material/product concepts. Through these four stages, the author begins the research by understanding the characteristics of the material being studied, which is LDPE waste. After understanding the characteristics of LDPE, the author creates a new experience that can be felt by users through this new material or by approaching the nearest material. The author then creates patterns from the material and designs new products using the new material that use the circular design principles of modularization and dematerialization.

RESULT AND DISCUSSION

The research results are elaborated based on the four steps of MDD.

Understanding the material

After conducting the experiments, it is discovered that gradually fused plastic yields neater results and reduces the risk of trapped air. The optimal fusing process is as follows:

- Switch on the heat press machine and set the temperature to 1500 C.
- Prepare four layers of LDPE plastic bags.
- During the fusing process, the plastic will always be sandwiched between two layers of Teflon paper. The bottom layer of paper prevents the plastic from sticking to the board, while the top layer of paper prevents the plastic from sticking to the heat press plate.
- Set the heat press to heat the upper part for 15 seconds, and then the bottom part for another 15 seconds.
- After 30 seconds of heating, remove the Teflon papers and test your fused piece to check for any trapped air inside.
- The process can be repeated several times to achieve the desired thickness of fused plastic.

Plastic waste collection > heat press preparation > heating process > fused plastic

Figure 2 Fusing Plastic Process

Source: [11]

The choice of media papers also influenced the results. Fusing results indicated that using Teflon paper as a medium resulted in a more even fusion of LDPE plastic. The thickness results after fusing tended to be more stable per layer. The suitable temperature for the production is 150°C in 15 seconds per step.

After identifying the optimal standard operating procedure (SOP) for fusing the plastic, the authors proceeded to implement the principles of circular design through modularization. Various module shapes were explored, and it was found that the arrow module (refer to figure 3) exhibited the most effective interlocking capability in terms of material utilization. The arrow module enabled the production of a greater number of modules, resulting in a larger final area compared to other modules. Consequently, it can be concluded that the geometric shape of the arrow module is the most efficient interlocking module, minimizing waste production and maximizing material usage.

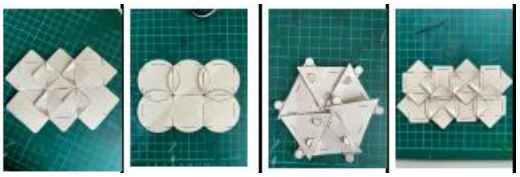
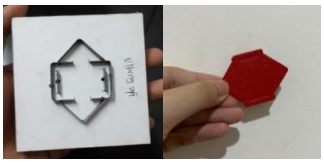


Figure 3 Interlock Modul Experiments
Source: [11]

In addition to shaping the modules, the authors explored the most efficient cutting method. Hand-cutting each module isn't practical for efficiency. Through experimentation with various cutting tools, it was determined that using a punch knife is the most effective method for cutting the modules. However, it's crucial to consider that the size of the pattern also influences the necessary pressure. If the module is too large, cutting the plastic accurately becomes challenging (refer to Figure 4).

Failed custom knife



Punch Blade

Figure 4 Cutting Tool Experiments
Source: [11]

Furthermore, in the pursuit of exploring different aspects of module creation, the authors experimented with the medium used to transfer heat. The findings revealed that the addition of texture to the fused plastic could be achieved by substituting teflon paper with aluminum foil as the heat transfer medium (see figure 5).

Figure 5 Medium Experiments
Source: [11]

Creating Material Experience

To know users' feedback about the material. The study conducts user testing on the fused plastic. This user testing process was conducted with two groups (see Figure 6). Group 1 consisted of three individuals. A (female) is 26 years old and works as an entrepreneur. She is not familiar with sustainable fashion products and lacks appreciation for recycled goods. B (female) is 28 years old and owns a laser-cutting business. She is interested in sustainable products and appreciates the production process. C (male) is 37 years old and runs a property business. He enjoys unique items.

Group 2 consisted of four individuals. A (female) is 27 years old and works as an entrepreneur. She is familiar with sustainable products, appreciates the process, and likes recycled products. B (male) is 30 years old and works in the property field. He is familiar with recycled goods but not very interested in them. C (male) is 26 years old and works in the technology and information field. He is not familiar with recycled products and lacks appreciation for the production process. D (female) is 29 years old and works in the food and beverage industry. She is familiar with local sustainable products.

The conclusion from the user testing results is that users are interested in the interlocking pattern and material. The interlock shape should be made more rounded at the edges so that it is not too sharp. Products made from this material are associated with fabric and can be used as wearable or decorative products. Most users are interested in using the material as a lampshade. The price range set by users varies depending on their awareness of the effort put into the product. When asked to guess what material this is made of, some users guessed that it was made of latex and plastic (but not LDPE). Some users were able to identify the material as plastic. Users also seemed interested and curious about the material. They held and examined the material, paying attention to the edges and the interlocking pattern. Users looked at both sides of the module.

The material sample tested

Figure 6 User Testing Process
Source: [11]

Manifesting Materials Experience Patterns

Based on the results of sample material testing, the positive characteristics of the selected material for development are the modular system, black and white color, texture, abstract composition, and asymmetry with the concept of anomaly. To shape this experience, benchmarking was conducted with other materials that can convey a similar impression (see Figure 7).

Figure 7 Material Benchmarking
Source: [11]

With the established characteristics, the next step is to initiate the brainstorming process by creating a moodboard (see figure 8). The moodboard serves as a tool in developing the material experience vision based on keywords such as modular, abstract, textured, asymmetric composition, and anomaly. This moodboard will assist in visually illustrating the concepts and feelings intended to be conveyed through the designed material. After researching and exploring the module connection method, several positive characteristics of the material were discovered, such as unlimited potential forms with the modular system and a level of transparency that allows light to pass through. These modules are highly flexible for connection in various configurations, providing numerous possibilities for creating different products.

Figure 8 Moodboard
Source: [11]

Designing Material/Product Concepts.

Based on the advantages of the characteristics of recycled LDPE material, which are modular, transparent, and abstractly textured, the researcher aims to integrate all exploration findings into the design of home decoration products, particularly lamps. The design process applies Circular Design methods to make the product cycle unlimited. It starts by collecting used plastic bags from the laundry, cleaning them, and pressing them into thicker plastic sheets. These sheets are then cut using a puncher knife, typically used for cutting paper or cardboard, which has been adjusted for exploration purposes into the shape of arrow module connections. Once the knife is ready, it is used to cut the melted plastic, and the modules are connected to assemble the final product, which is then processed into a finished product (see Figure 9). Subsequently, the product is distributed and tested on the target market to obtain initial feedback. When consumers want to replace the product with a new one, the waste can be easily recycled into raw materials as there is no mixture of other materials. If the product is damaged, the damaged part can be replaced with a new one, adhering to the modular principle.

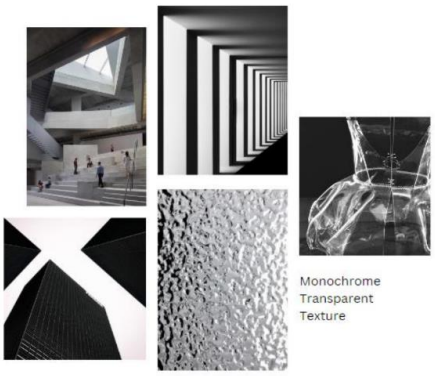


Figure 9 Moodboard
Source: [11]

The finished product was evaluated by 5 users who represent the target market for the final product—individuals who appreciate artistic aspects, waste management processes, and have high environmental awareness (see table 1). Product evaluation was based on six predetermined design criteria. Evaluation scores were provided on a scale ranging from 1 to 5, with the following criteria:

Table 1. User Review

No	Factors	A	B	C	D	Average
1	Design idea	4	3	4	5	4
2	Material uniqueness	5	5	4	4,5	4,625
3	Pattern	5	4	5	5	4,75
4	Size	4	5	5	4	4,5
5	Color	5	5	4	5	4,75
6	Lighting	4	5	5	4	4,5
Overall average						4,52

Through a series of experiments and design processes based on the Material Driven Design (MDD) research method and the application of circular design principles,

particularly dematerialization and modularization, this study has demonstrated the effective recycling of LDPE plastic waste using interlocking techniques. The recycled material can then be transformed into appealing table lamps for the market, especially with the use of captivating colors and patterns. Findings from this research underscore the potential to reuse LDPE plastic waste and provide insights into creating sustainable and visually appealing products.

The research findings, which showcase successful waste utilization through the Material Driven Design (MDD) method, are in line with previous research by [6]. Together, these findings emphasize the potential and effectiveness of MDD as a sustainable approach to waste utilization. Building on existing knowledge, this research contributes to the growing evidence supporting the feasibility of MDD in waste utilization and highlights the importance of promoting circular design practices.

CONCLUSION

The study reveals that integrating circular design principles, such as dematerialization, from the early stages of material process understanding, is beneficial for designers. By considering dematerialization, designers can consciously select products that can be effectively created using a single waste material. Additionally, the application of modular design principles allows designers to identify the most efficient modules that maximize the use of waste material while facilitating repair processes. By applying these principles, designers can contribute to a more sustainable and resource-efficient design approach.

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Rotary Veneer Bentwood as a Sustainable Material for Responsible Furniture Production

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Keywords:
Sustainable material, rotary veneer bentwood

ABSTRACT

The use of spindleless rotary peeling technology has revolutionized the processing of smaller diameter wood species like rubber wood and acacia, which were previously unable to be turned into rotary veneers using traditional methods that only accommodated larger diameter wood. This article is intended to provide valuable insights, particularly for furniture designers, on how to utilize environmentally friendly and efficient raw materials that retain the beauty of wood through 4 design cases (2 solid wood chair design & 2 bentwood chair design). The article was created through a descriptive analysis method, iterative design method, and material driven design method, which involved direct study and furniture design of mass-produced wooden furniture made from solid wood and prototype-scale bentwood furniture, as well as surveys of factories producing solid wood furniture and rotary veneers, and factories producing bentwood furniture. With comparison of all 4 designs, it is concluded that manufacturers can achieve a more sustainable, efficient, and environmentally friendly option for material, parts, and hardware usage by using rubber wood rotary veneer bentwood as the main material. Design, in terms of 3D production, rendering, technical drawings, assembly instruction also take less time to produce compare to furniture designs in solid wood material. In short, the use of rotary veneer bentwood is highly encouraged over solid wood, to support Sustainable Development Goal (SDG) 12 on responsible production.

INTRODUCTION

Veneer refers to a slender sheet of wood, typically with a thickness of 1-4 mm, obtained by rotating peeled wood. Other types of veneer may have different thickness, such as cocoveneer with 2.5-6mm layer thickness. This definition excludes other types of veneer such as sliced or sawed veneers [1]. Efficiently processing small-diameter trees into valuable wood products is currently limited, as conventional methods have low product recovery rates for such trees. This means that large forest areas and plantations are underutilized and considered low-quality. Veneer production is common in many countries but has been hindered by high capital investment and large-scale operations, particularly in developing countries. However, in the past decade, new technologies have emerged that show significant potential for developing veneer processing operations using small-diameter trees grown by farmers [2]. Spindleless lathes have made it possible to produce veneer sheets from small-diameter wood efficiently, with remaining core sizes of 20 to 50 mm. Compared to traditional veneer lathes, the capital cost of spindleless lathes is generally less than 10%, making them more accessible in developing countries. Veneer production offers a unique opportunity to increase the value of trees planted by smallholder farmers, creating new industries and job opportunities in developing countries. The modern spindleless veneer peeling technology represents a game-changing opportunity, revolutionizing the veneer production economy and subsequently, the production of veneer-based products such as plywood and laminated veneer wood.

Historically, only the largest and highest quality wood was deemed suitable for

making veneers [3], leading to low yield and high costs due to expensive wood and veneer processing. However, new technology with low capital costs (less than 20% of traditional spindle lathes) can now produce high-quality veneers from small diameter wood, resulting in yields above 75% [4]. This has brought about a permanent change to the veneer and plywood production economy, presenting enormous opportunities for forest owners and wood processors to extract more value from low-quality wood resources. In the future, veneer producers will prioritize small-diameter and fast-growing plantation logs, as well as small-diameter native forest timbers that can be supplied in significant volumes and delivered to processors cost-effectively. This will enable veneer processors to compete in an increasingly challenging market dominated by low-cost suppliers.

In numerous countries, low-quality hardwood plantations and native forest timber resources are mainly used for low-value applications like wood chips, landscaping, and bioenergy. However, with the potential for higher returns on investment and increased employment opportunities, these resources could be used to produce higher value products such as veneer-based engineered wood products. In recent years, there has been a rise in the growth of trees for rotary peeling purposes worldwide, particularly in Southeast Asia, with China and Vietnam taking the lead in processing very young plantation hardwoods using this technology [5]. The benefits of veneer-based products are a key driver of this growth. Additionally, technological improvements in rotary peeling equipment have allowed for efficient processing of very small and young plantation hardwoods, with diameters of less than 15 cm (and from trees less than 5 years old), including rubber, acacia, and coconut wood. The success of these operations has been such that rotary peeling mills have competed with pulp timber enterprises for the same quality timber resources in some areas.

Veneer-based products offer various advantages over other options such as sawing. Compared to sawmill processing, rotary peeling yields much greater product from the same size and quality of wood, due to the absence of sawdust or wood chips. This improved yield has a significant impact on the return on investment of wood processors. Veneers can also be dried more quickly, reducing energy costs and storage issues compared to solid wood products [6].

Amidst the destructive impacts of global warming and limited resources, there is a growing focus on promoting sustainable practices in the furniture industry. Previous research indicates that this sector significantly contributes to worldwide trade, utilizing a substantial amount of raw materials, releasing pollutants, and generating extensive waste. Each day witnesses the production, consumption, and disposal of millions of furniture items, exacerbating resource depletion and waste accumulation. These unsustainable production and consumption patterns underpin the prevailing linear economy, characterized by the acquire-make-waste cycle. Given this perspective, the overhaul of furniture production and consumption holds particular significance in advancing environmental conservation and fostering social sustainability [7].

This article aims to offer furniture designers valuable information about the potential of rotary veneer as a high-value engineered wood product that can be utilized in various applications, including furniture production. A comparative case study of the production of solid wood furniture and rotary veneer (bentwood) is presented to demonstrate the

suitability of rotary veneer for furniture products. Four chairs (2 solidwood chairs, and 2 bentwood chairs) are designed and studied to showcase the advantages and disadvantages of each. Furthermore, this article aims to advise wood producers to focus on producing more high-value raw materials, given the relatively premium quality of wood in Indonesia.

LITERATURE REVIEW

Furniture

In many industrialized nations, the furniture industry stands as a foundational sector, contributing 2% to 4% of the manufacturing output value [8]. The furniture industry operates fundamentally as an assembly sector, utilizing diverse raw materials in its production processes [9]. Consequently, the environmental consequences stemming from furniture are largely dictated by these materials, with previous research indicating that one-third of all materials extracted from the Earth are employed in the furniture industry [10]. Wood serves as the primary raw material in furniture production. However, current consumer behavior trends lean towards reducing the service cycle of products, particularly in the business furniture sector. This trend is characterized by the replacement of old furniture with new pieces before they reach the end of their functional life, driven by aesthetic considerations and image changes [12]. Consequently, the furniture industry faces a significant waste challenge. Throughout the lifecycle, from raw material acquisition to manufacturing and waste disposal, each stage contributes to the transfer of matter or energy to the natural environment. In accordance with the 17 UN Sustainable Development Goals (SDGs), the furniture industry contravenes SDG 12, responsible consumption and production (Goal 12 target 3, aiming to achieve sustainable management and efficient use of natural resources by 2030). Therefore, ensuring the sustainable development of the furniture industry in the current context is paramount.

Veneer

Innovations in the engineering of veneer-based products have led to the creation of stable and uniform materials that can be produced in a variety of sizes and consistently high quality. This is in contrast to solid wood products, which are often graded based on their defects and inconsistencies. Veneer-based products have the advantage of being able to conceal defects and provide a consistent and uniform supply of high-quality products. The process of rotary veneer processing also presents a unique opportunity to utilize low-quality wood that may not be suitable for other processing methods, such as sawing. Numerous techniques exist to rectify defects in veneers, including composing, scarf-jointing, patching, and splicing, all of which are employed to optimize the production of veneers [13]. During the repair process, the veneers are strategically placed in the center of the sheet, whether it be on plywood or LVL, to ensure complete coverage and preserve the product's appearance (only the finest quality veneers are used on the outermost layer) [14]. Simply say, lower grade veneers (e.g. grade D-F) can be hidden in the middle of the sheet, while higher grade veneers can be the face veneers (grade A-B) [15]. This practice allows maximum use of defect or lower quality materials, which is more sustainable in the long term, provided not much high quality wood is available these days.

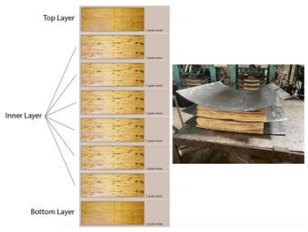

Fig. 1. Veneer Layering Illustration with Grading Consideration

Rotary Veneer Material

As wood becomes scarcer globally, wood producers are turning to smaller trees, such as rubber wood and acacia wood, which are popular in the Vietnamese furniture industry. Young plantation hardwoods are particularly suitable for veneer-based products, and there has been an increase in the number of rotary veneer processing facilities worldwide that successfully cultivate these trees. Spindleless rotary technology has also made it possible to process small-diameter wood. In the production of solid wood furniture and bentwood, both rubber wood and acacia wood are commonly used. Rubber wood, a medium density light-colored wood similar to ash or maple, grows in tropical regions of Southeast Asia, often from rubber plantations. It is considered environmentally sustainable because it is harvested after the latex production decreases, which extends its life cycle. This wood is popular due to its fast-growing nature, making it a more eco-friendly option than other solid woods. Rubber wood is commonly used as a raw material for furniture production in Vietnam due to its affordability and availability. This wood can be used as a material for both solid furniture and bentwood [16]. Approximately 2 million hectares of acacia plantations exist worldwide, encompassing three species: Acacia auriculiformis, Acacia crassicarpa, and Acacia mangium, with Vietnam accounting for 1.1 million of these plantations, boasting a rapid 5-10 year growth cycle [17]. The fast growth cycle of acacia wood is a key factor making it a popular raw material for furniture. Larger acacia wood is usually reserved for construction, furniture, and other applications while smaller wood is employed for paper and MDF production. In Vietnam, there are more than 3 million hectares of plantation forests consisting of a variety of fast-growing species like acacia, rubber wood, eucalypts, and pine, and while originally established to provide wood chips for the paper and pulp industry, there has been a growing interest in converting these plantations into higher value export products like veneer-based products for furniture components, laminated veneer wood, and other applications [18].

Solid Wood Furniture Disadvantages

It is clear that solid wood furniture requires many parts, joints, and hardware in order to stand into one furniture unit. There are quite a lot of examples of parts needed for a dining chair, including a seat, front legs, rear legs, apron, seat frame, backrest, and others depending on the design. The types of joints used also vary including mortise tenon, butt, mitre, rag, dovetail, and so on depending on construction and design. As for the hardware needed, especially to produce knock-down construction, there are quite a lot

of them, such as long bolts, short bolts, allen bolts, screws, allen keys, spring washers, flat washers, and so on. The more complex parts, connections, and hardware, will complicate the design process, sampling process, production, QC, and all related processes [19].

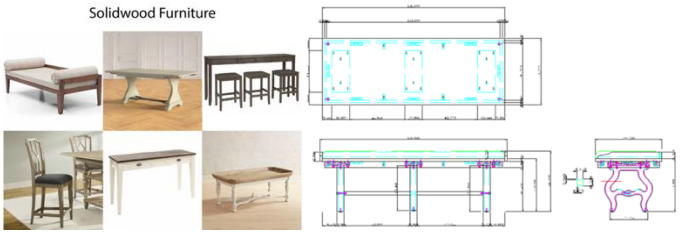

Fig. 2. Types of solid wood furniture & Complex solid wood furniture computer drawing (orthogonal view only, not included parts drawing)

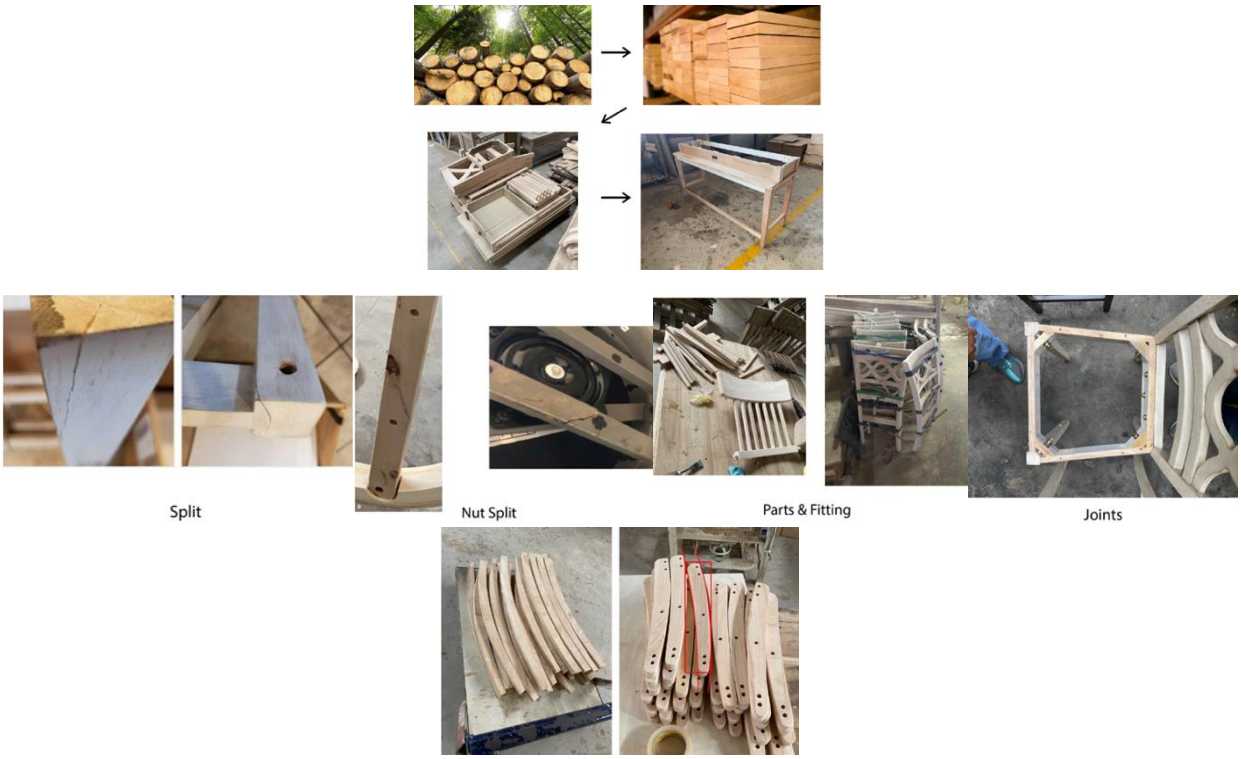

Fig. 3. Solid wood furniture brief production process & Issues with solid wood furniture

Bentwood Furniture Advantages

Brief production process of bentwood furniture includes veneer preparation, veneer cutting, molding, pressing, and finishing, as illustrated below [20]. Typically, not much hardware and parts are involved in bentwood furniture making, unlike those in solid wood furniture.

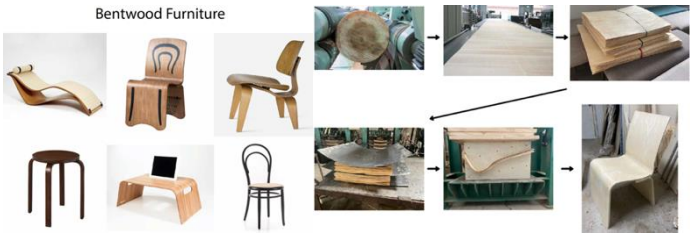

Fig. 4. Bentwood furniture & Brief production process

METHODS

This article was created using descriptive analysis techniques, iterative design method, material design driven method, including direct observation and study of the production of mass-produced solid wood furniture and prototype-scale furniture made from rubber wood veneer (bentwood). Researcher limits the research in veneer sheet made into bentwood form, steamed bentwood is excluded in this research. Chair is the foundation of furniture design, and the most sellable items in furniture retail, making it a solid ground when choosing the design category for case studies. Four designs were created (two in solidwood form, and two in veneer bentwood form, all of them are in standard dining chairs height). These 4 designs will be analysed based on parameters such as: furniture parts number, connection point number, hardware quantity, labor intensive process, computer modeling time, and complexity of assembly process. Surveys, designs, prototyping were conducted in both solid wood furniture factories and factories producing rotary veneer and bentwood. The research was undertaken in Vietnam factories. Additionally, literature from reliable sources was reviewed to provide further insights.

RESULT AND DISCUSSION

The life cycle phases of sustainable furniture encompass eight stages, which include design, procurement, manufacture, transportation, distribution, maintenance, recycling, and disposal. This study will specifically emphasize the design stage and the initial step of manufacturing, known as the prototyping stage.

During the design stage, the life cycle initiates with conceptual design, involving tasks such as information collection, idea generation, design drawings, computer-aided design, innovation, and new product development. Choices made at this juncture hold considerable significance as they exert an influence on the entire life cycle, spanning from manufacturing to the product's end-of-life [21]. This is because the selection of product materials and production techniques in the design phase determines the release of pollutants and wastes, energy consumption during use, and the ease with which components can be reused in subsequent usage and manufacturing cycles [22,23]. It is estimated that 70% of the environmental impacts arising from products are established during the design stage [24]. Consequently, the majority of a product's sustainability characteristics can be attributed to the early design phase [25].

Two detail data of solidwood chair designs are not presented as it is a confidential company data for production purpose, only final photo is allowerd (as in 4.3, Table 1.). The other two bentwood chair designs are presented below.

Project Description

Design 1, a stylish dining-sized chair that serves as a canvas for personal expression in chair design evolution. Its surface features various style graphics, allowing users to choose based on their preferences. Inspired by iconic chairs like Thonet and Napoleon, Design 1 blends tradition with contemporary flair. Beyond aesthetics, it prioritizes comfort with a curved back for lumbar support during extended sitting. Additionally, a unique metallic waveform storage beneath the seat provides convenient access to favorite magazines or novels, combining form and function seamlessly.

Fig. 5. Bentwood Chair Design 1

Design Challenge

Revolutionizing postmodernism in furniture, this contemporary chair seamlessly incorporates iconic images from the modernism era without overpowering its overall design. It aims for a lightweight and comfortable feel, using minimal tools and hardware while ensuring robust construction for user safety. Beyond its expressive platform, the chair prioritizes its fundamental function, aiming to provide both comfort and ease of use.

Fig. 6. Design Alternatives to Bentwood Chair Design 1

Design Solution

Transforming 3D shapes of classic chairs into 2D graphics, Design 1 carefully integrates them onto its surfaces, ensuring a harmonious standalone or set design. Leveraging Laminated Veneer Lumber's flexibility, it molds to the human back's contours for maximum comfort with minimal material use. This yields a sleek, organic design offering ample surface area for user support. The space between slim front and rear legs is utilized for a metal storage feature, not only providing extra storage but also reinforcing the overall structure. Opting for metal ensures durability, especially when accommodating various items, heavy or light, enhancing both function and strength.

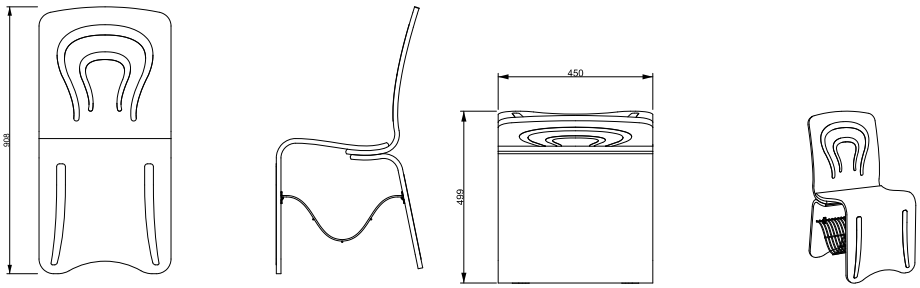

Fig. 7. Dimensions of Bentwood Chair Design 1

Design Impact

Introducing Design 1, a versatile seating solution for users to relax while engaging in activities like reading, watching movies, or working. It features a convenient storage space below the seat for books or belongings. Prioritizing ease-of-use, comfort, and serviceability, It has only four removable and replaceable parts, extending its lifespan. Crafted with real wood veneer for the main body parts and a durable, recyclable metal storage, this chair is eco-friendly, offering a sustainable seating option.

Fig. 8. Prototyping Process for Bentwood Chair Design 1

Bentwood Design Concept 2

Project Description

Design 2, is a versatile stool designed for interactive pet experiences indoors. It features a unique shelf under the seat for pets or storage, customizable openings on the stool legs, and an optional low back-rest with a handle for added functionality and convenience.

Fig. 9. Bentwood Chair Design 2

Design Challenge

Revamp home furniture with integrated pet-housing for both young and adult users. The design prioritizes simplicity, user safety, and easy assembly with minimal tools.

Design Solution

Design 2 employs a 100% veneer bentwood manufacturing process, providing strength without bulky design. The freedom in veneer-laminating allows for unconventional shapes and efficient linking of stool parts, reducing the need for additional equipment for the end-user's benefit.

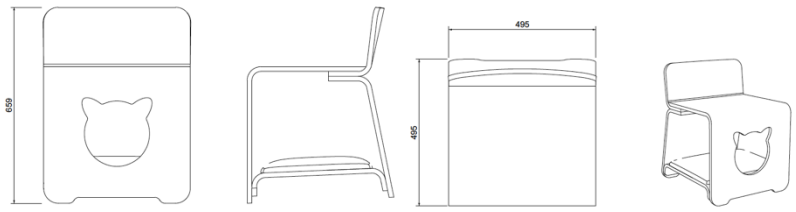

Fig. 10. Dimensions of Bentwood Chair Design 2

Design Impact

Design 2 is a versatile furniture piece that serves as a home for pets, offers extra storage, and introduces a unique multipurpose experience. Designed with simplicity, modularity, and sustainability in mind, Design 2 is crafted with 100% real wood veneer, promoting recyclability and environmental friendliness. Its parts are easily removable and replaceable for extended product lifespan.

Fig. 11. Prototype of Bentwood Chair Design 2

Comparison between Solid Wood Furniture and Bentwood Furniture

Table 1. Solid Wood Furniture vs Bentwood Furniture Comparison

Chair A&B (solid wood)

Chair C&D (bentwood)

Parameter	A	B	C	D
Furniture Parts number	24	19	4	5
Wood joints number	47	23	11	6
Hardware quantity	59	57	11	18
Labor intensive process	high	high	moderate	moderate

Computer modeling & rendering time	Est. 6 hours	Est. 5 hours	Est. 2 hours	Est. 2 hours
Assembly Instruction	complex	complex	easy	easy
Assembling Time	moderate	moderate	quick	quick

In solidwood dining chairs, many furniture parts are needed to assemble a single chair, including seat frame, back rest, back leg, front leg, apron, and stretcher. To join all these pieces together, many wood joints and hardwares are needed, mainly because almost all furniture in retailers today are in knock-down system. In short, solid wood furniture is much more complex from design process, material processing to manufacturing, while veneer bentwood furniture is much more simple in similar fashion.

CONCLUSION

Rotary veneer converted to bentwood furniture is a more environmentally friendly, sustainable, efficient option in the use of materials and hardware. The advantages of using rotary veneer as raw material for furniture are:

- Increased yield and value of forest resources. Rotary veneer can be produced from low-quality wood resources that are not suitable for traditional sawn timber products. In addition, the veneer yield obtained is usually about 2 to 6 times more than the rotary peeling process compared to the sawing process, especially when using small-diameter wood sources. The sawn yield (sawn timber) usually only gives a yielf of about 35%, while in rotary veneer it can be up to 70%.
- More predictable product outcomes, faster production, and more possible product dimensions. Products based on rotary veneer can be produced in greater length, width, and thickness compared to products produced by traditional sawmills.
- Unlike solid wood products, veneer-based products can tolerate defects by upgrading veneers. The appearance of imperfect veneers that have gone through the upgrading process can also be hidden by slipping the veneer in the middle of the sheet before the veneer is pressed into bentwood.
- Use of materials that are much more efficient than solid wood
- Significantly reduced waste (scraps, sawdust, others) compared to solid wood furniture production waste
- Much better working conditions because not much sawdust is produced
- Reduction in the number of parts, the number of connection points, the number of hardware used significantly
- A more sleek and modern product look
- Significantly reduce time in furniture computer modeling and rendering setting
- Significantly reduce the number of labor, electricity cost, range of machineries, during production process
- Indonesia furniture design landscape still surrounds in solid wood form. With all source of beautiful woods come from Indonesia, bentwood furniture has not been widely developed
- In the current business landscape, design plays an increasingly prominent role, with its implementation proving crucial for the created value and management

possibilities. Design has the capacity to revolutionize a company's image, streamline costs, and foster innovation in products and services. It aids in upholding product quality across functional, production, economic, and socio-cultural dimensions while enhancing the competitiveness of enterprises. The stakeholders, or designers, engaged in design activities play a pivotal role in this phase, and their creative latitude can significantly influence the materials and characteristics of the final product. During the design process, designers have the autonomy to choose and define the material, formal, and practical aspects of furniture, thereby impacting the emotional response and subsequent consumer behavior. For instance, designers can heighten consumer awareness of environmental concerns through the design of websites, advertisements, brochures, and other promotional materials, facilitating communication about the benefits of using eco-friendly products. Hence, the value derived from design activities extends beyond commercial and material gains, encompassing ecological values and social responsibility.

However there are some limitations in the research, as discussed below:

- In the manufacturing of wood-based products (including veneer bentwood), adhesives are employed, potentially leading to pollution. The utilization of environmentally friendly adhesives derived from forests has the potential to broaden opportunities for extending the life cycles of forest products through reuse and recycling, though it has not been executed in this research.
- Ensuring an effective guarantee for maintenance services proves challenging. On a typical basis, consumers opt to purchase new furniture every three years. The primary motivation behind such purchases is the necessity to replace furniture that has become worn or damaged. The predominant issue arising after three years of furniture use is the deterioration of parts, material wear, and the absence of support from furniture companies in terms of repairs and spare parts services for customers. Consequently, the accumulation of end-of-life products becomes problematic, posing difficulties in management, elimination, and destruction. This problem applies for all types of furniture (both solid and bentwood).

This conclusion results from research activities undertaken in Vietnam on bentwood furniture made of local rubber wood as the main source of veneer. Other types of veneer may vary slightly in terms of conclusion, although generally should have similar results.

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The author wish to thank CRCC Pelita Harapan University for supporting this research No PM-45-SoD/VIII/2022. A big thanks also for partners at New Elegant (William Chou and Aditya Cipta Sugandha) for their assistance during the research process.

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Media Strategy For Umkm Ecoprint Product Promotion Sekar Widuri In Mojosari

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Ecoprint,
Promotion,
Strategy,
Media,
Sekar Widuri

ABSTRACT

UMKM Sekar Widuri was founded on December 15, 2021 by Imsyak Alifah. UMKM Sekar Widuri provides ecoprint training to PKK group mothers in Seduri Mojosari village. Limited knowledge about promotional media strategies from ecoprint products that have been produced affects sales and the difficulty of competing with other ecoprint products. Because it only uses makeshift promotional media without a logo, less attractive packaging forms, without any labels on the products produced, posters, signboards and social media. So that the results of ecoprint products offered are limited to certain circles. Therefore, it is necessary to increase knowledge not only in terms of ecoprint techniques but also in terms of marketing media strategies so that they can be known by the wider community and have a high selling value. The main output is in the form of logos, unique and attractive packaging, other supporting promotional media such as posters, flyers, signboards, and hang tags. The activities carried out by the proposer team with partners are as follows: 1) Feasibility Study in the form of a preliminary study conducted by the proposer team to find out the problems experienced by Sekar Widuri UMKM in participating in the activities offered, judging from the problems faced. 2) The implementation of activities begins with a licensing process of both places and facilities with Sekar Widuri UMKM in Seduri village to ensure the time and place of implementation. Tracking with technique: presentation. 3) After the activity after the implementation of the activity, the Team prepares a final report which will be presented through an International seminar (ICCSAL). After that, the team also compiled articles to be published in scientific journals/proceedings.

INTRODUCTION

Mojosari is one of the small cities as the capital of Mojokerto regency located at the foot of Mount Welirang, about 15 km north of Pacet. Mojosari as the city of Adipura has a city beauty that is different from other cities, shady trees, flower pots along the road and the cleanliness of the city is well maintained. That way the air of Mojosari is very cool and fresh. The geographical location of Mojosari City is located on alternative routes of big cities such as Surabaya, Sidoarjo, and Malang. Mojosari is a sub-district designated and prepared to become a target city for Mojokerto Regency since early 1990. In 2012, Mojosari was de jure designated as the capital of Mojokerto Regency[1] Ecoprint is a technique to display colors from natural materials on the surface of fabrics without chemicals. The dyeing technique is carried out by attaching natural materials (can be leaves, seeds or stems) to the surface of the fabric. [2], [3]. So that the waste produced does not pollute the environment. Given that Seduri Village is located at the foot of Mount Welirang so that the beauty of nature should be maintained. Seduri Village has natural potential around which can be the basic material for making ecoprints. Natural materials that can be utilized include teak trees (tectona grandis), jatropha kepyar trees (riccius communis linn), mahogany trees (switenia mahagoni), kenikir flowers (cosmos caudatus), and waru flowers (hibiscus tiliaceus) which is abundant in the village of Seduri [12].Its leaves as well as abundant flowers can be explored into motifs unique and interesting.

Teak leaves will emit purple and red colors. Kenikir leaves produce unique leaf motifs

because of the thin and fingered shape of the leaves. The shape of Jatropha Kepyar leaves is also unique and can produce green to brass colors. Mahogany fruit produces a yellow color on the fabric [4]. The patterns produced from ecoprint techniques often produce unexpected colors and motifs (one of kind) [2]. Ecoprints are unique because they cannot be repeated. The coloring materials (leaves or flowers) used are not the same, the coloring materials used in one place and in another place will be different. Even the two sides of the leaves used cannot be the same [5]. Leaves can be printed only white without the leaf bones. Il peut également être imprimé tout, des feuilles aux pétales. Ainsi, il est très difficile si vous voulez faire une grande quantité de tissu avec le même motif et la même couleur [4].

Limited knowledge on how to promote ecoprint products, makes the products produced by Sekar Widuri UMKM only known in certain circles in Seduri Mojosari village. The turnover of ecoprint products is 30 million rupiah, it's just that the money earned is still 1 million.1.1 Partner Problems.

Fig 1. UMKM Products Sekar Widuri

Based on the observations and interviews of the proposer team, ecoprint products produced or produced by UMKM in Sekar Widuri Seduri Village are quite competitive with other ecoprint products. However, the lack of a promotional strategy carried out by Sekar Widuri made the sales of the resulting products go on the spot. This can be caused by the absence of product identity in the form of the Sekar widuri logo, unique and attractive packaging, brochures as a reference for ecoprint products that have been produced, posters, signboards and social media such as Instagram, of course, all designed communicatively and elegantly.Based on the observations and interviews of the proposer team, ecoprint products produced or produced by UMKM Sekar Widuri Seduri Village are quite competitive with other ecoprint products. However, the lack of a promotional strategy carried out by Sekar Widuri made the sales of the resulting products go on the spot. This can be caused by the absence of product identity in the form of the Sekar Widuri logo, unique and attractive packaging, brochures as a reference for ecoprint products that have been produced, X-banner, signboards and name plate, of course, all designed communicatively and elegantly. 1. Have an identity to make it easier for consumers to remember and know the existence of Sekar Widuri ecoprint in Seduri Village in the form of the Sekar Widuri Logo. 2 . Create or design unique and attractive packaging for Sekar Widuri ecoprint products consisting of primary packaging and secondary packaging in the form of paper bags. 3. Nameplate 4. X-Banner 5. Price tag.

Fig 2. Media of UMKM ecoprint products Sekar Widuri

Starting from the problems faced by partners, the team proposed creating an ecoprint product promotion strategy program for UMKM Sekar Widuri Seduri Village. This program aims to increase marketing reach through the development of conventional/offline promotional media strategies, including: Have an identity to make it easier for consumers to remember and know about the existence of Sekar Widuri ecoprint in the village of Seduri in the form of the Sekar Widuri logo. 2 Create or design unique and attractive packaging for Sekar Widuri UMKM ecoprinting products consisting of primary packaging and secondary packaging in the form of paper bags. 3. Nameplate 4. X-Banner 5. Price tag

SOLUTIONS

Accompagner et aider à augmenter les ventes de produits qui ont été fabriqués grâce à des stratégies media promosi ecoprint UMKM Sekar Widuri Desa Seduri Mojosari Kabupaten Mojokerto by the proposing team as a solution to the partner's problems, namely:

Making the Sekar Widuri Logo as a marketed identity, because currently it does not have a patent logo. The logo will be attached to the packaging and price tag The packaging design consists of two packaging, the first is primary packaging in the form of ecoprint product packaging and the second is skunder packaging in the form of paper bags [11]. The proposer team also helped design the other supporting media such as making signage, and hang tags. Products Sekar Widuri's UMKM ecoprint product promotion media strategy will go through the design process and design principles by determining the target audience, design visualization with product shooting..

IMPLEMENTATION METHOD

To solve the problems faced by Sekar Widuri UMKM and the steps in carrying out this activity are as follows:

a. Helping to design Sekar Widuri UMKM promotion media
b. Implementing the design results in several Sekar Widuri MSME products.
c. Evaluate the results of activities to find out the response of the target audience to the training that has been carried out.

Implementation Strategy

1. Introduction Stage

The introduction here includes the introduction of the team to the owners of Sekar Widuri UMKM, an introduction to the promotional media needed by Sekar Widuri UMKM. And also shown some examples of media design, manufacturing process, and

products produced.

2. Implementation Phase

a. Place preparation. The place to be used must be prepared in such a way that training can be carried out smoothly, both for the provision of theory and for practice.
b. Preparation of materials and tools. Materials and tools must be prepared in advance so that training can be carried out on time.

3. Report Documentation Stage

The report documentation stage is the last stage of this training activity.

Activities carried out by the implementation team together with partners outline the following steps:

1. The Feasibility Study is in the form of a preliminary study conducted by the Implementation Team to find out more about the readiness of UMKM Sekar Widuri Seduri Village in participating in the activities offered, judging from the problems faced. This stage is carried out by interviewing techniques and discussing with Imsyak Alifah's mother. The interview was then followed by direct observation to find out in real terms geographical and demographic conditions.
2. The Implementation Team carried out this PKM activity as scheduled by bringing the necessary equipment and materials. During the training, monitoring and evaluation were also carried out both by the proposer team itself and the UNESA Community Service Institute by visiting the location during the activity. The implementation of PKM activities is divided into two stages, namely:
   a. Designing promotional media strategies For promotional media strategies, the team coordinated with Mrs. Imsyak Alifah as the owner of UMKM Sekar Widuri on how to promote effective and communicative ecoprint product promotion media strategies to raise the ecoprint image of Seduri village, Mojosari sub-district while increasing people's purchasing power for products resulting from ecoprint training in the form of logos, packaging designs and promotional media.
   b. Creating promotional media Increase people's purchasing power for ecoprint products produced by Sekar Widuri UMKM in the form of logos, packaging designs, x- banners, signboards and price tags. The team provides marketing management coaching that is closely related to the promotion aspect, considering that one of the teams has relevant expertise in the field of product promotion (Visual Communication Design).
   c. The output at this PKM is in the form of product promotion media from the results of ecoprint in the form of logos, packaging, x-banners, signboards, and price tags.

POST ACTIVITY

According to the implementation of activities, in addition to the output of the products produced, the final report will be presented at an International Seminar (ICCSAL). After that, the team also compiled articles to be published in scientific journals/proceedings. Partner participation plays an important role in the realization of this PKM program

because the level of partner participation is one of the benchmarks of success. Partners play an active role in participating in the implementation of activities ranging from socialization and direct training in fabric dyeing and making motifs on fabrics with ecoprint techniques. The participation of partners in the implementation of this Community Service Program is:

a. Partners provide activity facilities in the form of meeting places to make direct observations;
b. Partners are willing to be assisted in making logos and promotion media from the result of their ecoprint product "equation (1)".

RESULT AND DISCUSSION

Fig. 3. Logo, price tag, X-banner, signage, paper bag

CONCLUSION

Some existing promotional media still seem sober and have not been designed optimally. As a product identity, the need for a logo as a product identity. So the logo or brand is an element of signs / symbols as an identity that must have a positive image and be effective to support various interests, especially in terms of promotion Thus, to support the media strategy of promoting Sekar Widuri UMKM ecoprint products in Seduri Village, the team designed a logo, packaging, paper bag, X-banner, signboard, and hang tag to increase the selling value of these UMKM

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Gender in Indonesian Folklore: A Corpus Linguistic Study

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ABSTRACT

This research aims to describe diction that reflects gender in Indonesian folklore. The gender of the characters in folklore is visible through the diction used. This research uses a mixed approach, namely combining a quantitative approach and a qualitative approach. This research uses corpus linguistics methods. The research data is in the form of 110 Indonesian folk tales downloaded from the Ministry of Education and Culture's Language and Literature Diversity Laboratory. Based on the use of diction, it is known that (1) the characters in Indonesian folklore are male and female; (2) the use of male characters is more numerous and widespread in Indonesian folk tales than female characters.

INTRODUCTION

Literature utilizes language as its primary medium. There is no literary work without language. Literature is the depiction of human experiences, emotions, ideas, and beliefs in an engaging manner through the use of language [1]. Literary works are miniature representations of life produced through the creative process of their creators. Without language, authors or poets would be unable to convey their ideas and imaginations to society. In literary works, the selection of diction must be done carefully because the appropriate diction has the ability to provide attractiveness, beauty, and the achievement of intended meanings. Diction plays a crucial role in creating allure in literature. Profound meanings will stimulate readers to think deeper in interpreting literary works. Indeed, diction greatly influences the success in achieving the second modeling system (the second level of language) in a literary work. According to [2], it is a mistake to consider word choice (diction) as something trivial and unimportant in the realm of language, including literary works. In other words, the quality of literary works is partly determined by the author's or poet's selection of words in their work.

Literary works, in general, are divided into three genres: prose, poetry, and drama. One form of prose genre is folklore. Folklore belongs to oral literature. Folklore is a narrative of local communities passed down from generation to generation, either in written or oral form. Nearly every region in the Archipelago has its own folklore. Therefore, the Archipelago possesses a vast and diverse collection of folklore representing each region within it. Folklore is the ethnic wealth of the people of the Archipelago. According to [3], folklore is fiction that does not contain factual elements, but it carries values and norms that are equally important as facts. Due to its regional nature and oral transmission, the diction used in folklore naturally possesses distinct characteristics when compared to modern literary works.

Literary works are a projection of real life. Literature serves as a miniature of real

life depicted from the author's perspective, including the portrayal of characters within the literary work. Characters are the actors within the story. Thus, characters in a folklore story are reflections of the society living at that time. Although not entirely valid since literature is the product of the author's imagination, at least through literature, we can understand how gender is portrayed through its characters.

Gender differs from sex or biological sex. Although often used interchangeably by society, they have distinct meanings. Biological sex pertains to the human biological aspect related to the body's organs and functions, while gender refers to a complex set of behaviors (psychological characteristics) that are manifested through one's social experiences when interacting with other humans, whether of the same or different sexes [4]. According to Fakih [5], gender is an inherent attribute of sex, whether male or female, shaped by social and cultural factors.

Based on the background provided, the issue to be addressed in this scholarly article is how gender is portrayed in the characters used in folktales of the Archipelago. Furthermore, this research also aims to determine which gender predominates in the folktales of the Archipelago.

RESEARCH METHODS

The data source in the research is folklore taken by the Language and Literature Diversity Laboratory of the Ministry of Education and Culture which is accessed on the page https://labbineka.kemdikbud.go.id/language/ceritarakyat which consists of 110 Indonesian folktales. The research data is in the form of Indonesian folklore texts which were processed using the corpus linguistic program Ant Word Profiler 2.0.0 [6] which can be downloaded for free at https://www.laurenceanthony.net/software/antwordprofiler/.

RESULTS AND DISCUSSION

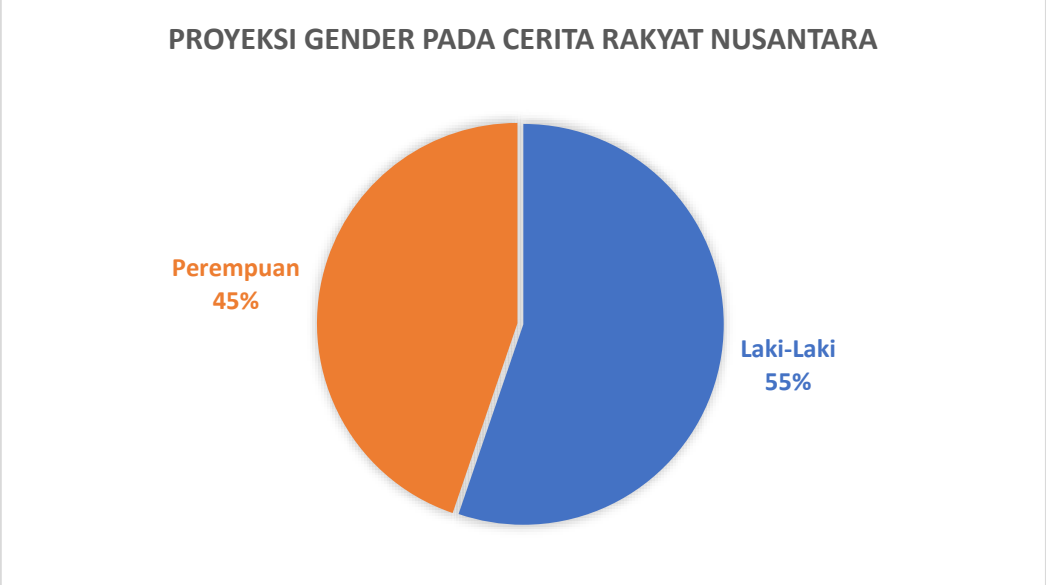

Chart 1. Gender percentage in Indonesian folklore

Patriarchy is a societal system that prioritizes male or paternal lineage. In Indonesian

society, patriarchy greatly influences various social structures [7]. Patriarchal culture is very strong in the socio-cultural life of Indonesian society, but gender equality in Indonesian society has progressed [8]. Men and women have their respective roles in social life. Based on research data, it appears that the appearance of male characters is slightly more than that of female characters. In fact, based on the frequency of appearance, female characters are slightly superior, namely 9,362 times (see table below) compared to male characters, namely 9,265 times. In Indonesian folklore, male characters appear at 55%, slightly above female characters which appear at 45% of the 110 Indonesian folktales that are used as research data. The emergence of male characters occupying leadership roles such as the roles of kings, kings, sultans, princes and raden, while female characters have roles as male companions, such as empresses, ladies-in-waiting and queens. This is in line with research by [9] which explains that male characters obtain noble positions or positions. [9] explain that male characters still appear to dominate in Indonesian folklore.

Table 1. The occurrence (frequency) and range (range) of diction between men and women

Male Pronouns		
Diction	**Frequency**	**Range**
ayah	985	66
raja	4007	64
tuan	971	64
nak	386	60
putra	515	37
baginda	517	26
paman	245	26
dewa	623	24
kakek	339	24
pangeran	544	23
ki	906	18
datuk	736	12
sultan	448	12
raden	294	10
bang	241	10
gusti	169	10
imam	240	6
sutan	399	5
prabu	362	5
syekh	345	5
Total	**9265**	**443**

Female Pronouns		
Diction	**Frequency**	**Range**
ibu/ibunda	3506	83
gadis	597	59
putri	2264	58
nenek	643	37
permaisuri	523	30
dayang	269	24
bidadari	174	16
ratu	332	15
dewi	364	12
nyai	369	10
bibi	159	8
nyi	162	7
Total	**9362**	**359**

The figure of the mother or mother appears in 83 titles out of 110 folklore titles in the data sample. In other words, 75% of Indonesian folk tales contain mother figures. Apart from that, the diction "mother/mother" appears 3,506 times, which far exceeds other female characters. The mother figure is the main figure in life both socially and culturally. According to [10], apart from giving life in the world, in the story the mother figure also plays the role of protector and protector in life. In general, mother characters have characteristics that are feminist, patient, loving, and full of sacrifice. However, based on research by [11], in Indonesian folklore, the figure of the mother is also depicted as having a masculinity character. The character of masculinity in a mother usually emerges as a response to threats that arise that threaten herself and the people around her that she cares about. The masculinity character of a mother in Indonesian folklore appears in the form of sacrifice, hard worker, nurturing, protector, educator [10]. Based on these data, it appears that mother figures are widely used in Indonesian folklore.

Despite being the character that appears most frequently in the male gender, father figures do not appear as much as mother figures. The father figure only appears in 66 titles out of 110 Indonesian folk tales that were used as research data, or only 60%. In the socio-cultural life of Indonesian society, the father figure is the main backbone of the family. The father figure has a big responsibility in the family. Physiologically, fathers (men) are physically strong and dashing. Therefore, the father figure is depicted as a protector and savior from danger. When a child character appears in a story, the mother and/or father figures will automatically appear in the story because a child often cannot be separated from his parents before the child can live independently.

Several Indonesian folk tales use royal settings so they use characters who reflect royal life. Male gender figures in royal life in Indonesian folklore include king (64 titles), king (26 titles), prince (23 titles), sultan (12 titles), raden (10 titles), sutan (5 titles), and prabu (5 titles). Meanwhile, female characters in royal life in Nusantara stories include the

empress (30 titles), lady-in-waiting (24 titles), and queen (15 titles). Apart from appearing in 64 titles, the diction "king" appears 4,007 times in the research data. This indicates that the king is an important character in developing the storyline. Apart from that, in stories set in a kingdom, the characters in Indonesian folklore are dominated by male characters. This is not surprising because the social system of Indonesian society is dominated by a patriarchal social system. In a patriarchal system, a man will be born as a leader. Therefore, kings and several male figures (princes, sultans, raden, etc.) are the characters who often appear in stories set in kingdoms because they are leaders who hold power in determining policy.

The Nusantara Kingdom also adheres to a patriarchal system, namely the prince (son of the king) as the heir to the royal throne. Women occupy a subordinate role in the socio-cultural environment. Research data shows that the empress character is mentioned 523 times in 30 story titles, the lady in waiting is mentioned 269 times in 24 story titles, while the queen character is mentioned 332 times in 15 story titles. The appearance of the empress, lady-in-waiting and queen figures represents the subordination of the role of women in royal life in Indonesian folk tales.

CONCLUSION

The appearance and use of male characters still dominates Indonesian folklore, although this dominance is not very significant. This is in accordance with the social system used by the majority of ethnic groups in the archipelago. Gender in Indonesian folklore is more about the role of the character to support the storyline. Gender in folklore is more of a cultural representation that commonly occurs in society. Nusantara folklore is a literary work that is still natural in nature. This means that Indonesian folk tales were not created with the aim of campaigning for a particular ideology that contrasts with the socio-cultural system of the Indonesian people. Writers (creators) of Indonesian folk tales have not been able to escape the patriarchal ideology which is a traditional gender role that has been entrenched and accepted by Indonesian society.

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Application of Gulijat Techniques on Textile Products of The MGMP Art And Culture SMK of Gresik

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ABSTRACT

Gulijat cloth is the name for cloth decorated using a combination of folding and knitting. Gulijat itself is an abbreviation of roll-fold-jump-tie. The motifs produced from this technique are different from jumput or shibori fabrics. This service activity aims to increase knowledge and skills as a provision to enable students to create fine arts. Considering the existing level of education, of course more than one knowledge and skill is needed. Knowledge and skills in the field of fine arts are still minimal for most members of the Gresik Regency Vocational School Arts and Culture MGMP because their educational background is not in the field of arts, including fine arts. The research method used is qualitative research presented descriptively. Data collection was obtained from documentation studies, questionnaires and direct observation. The research subject was the Gresik High School-Vocational School Arts and Culture MGMP. To validate the implementation data with triangulation. As a result of the training, partners have been able to practice Gulijat techniques according to the correct procedures and the products created show clear motifs. After attending this training, it is hoped that the MGMP Arts and Culture participants at the Gresik Regency Vocational School will be able to teach it to students at their respective schools.

INTRODUCTION

Subject Teacher Deliberation (MGMP) is a forum for teachers who teach the same subject, with the aim of sharing experiences, insights and thoughts, in an effort to improve the quality of learning in that subject. Through MGMP, coaching and training is usually carried out to increase the knowledge and skills of its members, one of which is carried out by the Gresik Regency Vocational School Arts and Culture MGMP. MGMP Arts and Culture SMK Gresik district was only established in 2017, after being separated from MGMP Arts and Culture SMA Gresik district. This separation was carried out in an effort to maximize potential and considering the large number of members. On the other hand, the differences in Arts and Culture learning outcomes in SMA and SMK are also a separate consideration.

Gulijat cloth is the name for cloth decorated using a combination of folding and knitting. This name and technique emerged as an effort to develop jumput cloth, which is a traditional Javanese cloth, combined with the Shibori technique, said to be from Japan, whose motif is produced from folds. Gulijat itself is an abbreviation of roll-fold-jump-tie. The motifs produced from this technique are different from jumput or shibori fabrics.

The application of the Gulijat technique to textile products was chosen with the consideration that participants simultaneously practice applying certain motifs to certain parts, for example on sheet fabric, blouses, hems, t-shirts, mukenas, and chair cushion covers. In this way, participants can have experience and then develop it in their learning at their respective schools.

As teachers of Arts and Culture subjects, in this case the field of fine arts, teachers are required to master the knowledge and skills to enable students to create fine arts. Considering the existing level of education, of course more than one knowledge and skill is needed. Knowledge and skills in the field of fine arts are still minimal for most members of the Gresik Regency Vocational School Arts and Culture MGMP because their educational background is not in the field of arts, including fine arts.

Training activities are carried out using lecture, question and answer, demonstration and joint practice methods. Lectures are given to convey material related to the meaning of the Gulijat technique, the materials used, the equipment required, steps for making Gulijat works, coloring with napthol, and completion of the process. In more detail, the method of implementing Gulijat training activities with Napthol dye is described as follows Introduction stage and Implementation Stage. The introduction here includes an introduction to the PKM team and an introduction to training materials. An introduction to the Gulijat technique was carried out by giving a short lecture accompanied by a PowerPoint presentation and supported by handouts. The PKM implementation stages are divided into three, namely:

1) Preparation

Preparation participants for this activity included all members of the MGMP Arts and Culture Vocational School in Gresik Regency, approximately 25 people. Participant are vocational arts and culture teachers who do not yet have the knowledge and skills to make works using the Gulijat technique. Efforts are made to prepare a place for carrying out activities that has easy access, has adequate space for the work process, has an open shaded area with sufficient water supply for the process. Coloring and drying Materials and tools need to be prepared in advance so that training can be carried out on time. Checking the materials and tools needed is also carried out before the activity so that if there are needs that have not been met, efforts can be made immediately. The main materials needed are plain/light colored fabrics and textile products, as well as napthol dyes. The equipment needed includes rubber bands, raffia rope, ice cream sticks, color tubs, scissors/cutter, and rubber gloves.

2) Implementation of Activities

Training activities are expected to be carried out in July, August or September 2023. The timing will be mutually agreed with the partners, namely MGMP Arts and Culture SMK Gresik district

3) Final Stage

At this final stage, an evaluation is carried out with the participants by appreciating the works produced. It is hoped that this will provide two-way benefits, namely for the implementing team and for the participants. For the team, through casual chat or through questionnaires, you can determine the level of absorption of training material by participants as well as determine participants' responses to the training provided. As for the participants, through dialogue it is hoped that they can ask questions, impressions, and also criticize the training has been implemented and hopes for further training.

RESEARCH METHODS

The research method used is qualitative research presented descriptively. namely by describing the activities of applying the Gulijat technique to textile products in the form of bags, t-shirts, tablecloths and headscarves. Data collection was obtained from documentation studies, questionnaires and direct observation. The research subject was the Gresik High School-Vocational School Arts and Culture MGMP, which was carried out in two meetings. To validate the implementation data, data triangulation is carried out, namely the stage of checking the suitability between the results of questionnaire observations and documentation studies.

RESULTS AND DISCUSSION

The team carried out service activities at the MGMP Arts and Culture Vocational School, Gresik Regency. The activity was carried out in July 2023. The activity began with an introduction to the PKM team and an introduction to material about Gulijat. The term Gulijat technique is an abbreviation of Roll, Fold pinch, and tie. three techniques combined into one to produce new motif innovations. This is the basis for providing material to vocational arts and culture teachers so that they are motivated to provide different things in developing their students' skills.

Figure 1. Delivery of knowledge

(dok. Budi Defri, 2023)

In the process of making Gulijat cloth, participants fold, pinch, tie and roll the prepared material using sticks, rubber and raffia. In making Gulijat cloth, the team did not limit the techniques used because with experience from training, the hope is that participants will know the characteristics of the folds and ties of the cloth. The results of projects given by MGMP arts and culture teachers can explore various motifs.

Figure 2. Fabric folding stage

(dok. Budi Defri, 2023)

After the folding process continues with the coloring process, in this stage the teacher can combine several colors in applying the motif, this will influence the results of the motif created. After the coloring process is complete, it continues with the untying stage, this stage determines the resulting motif. The dye used in practice is napthol dye.

Figure 3. Coloring proccess

(dok. Budi Defri, 2023)

The Gulijat products produced from the training are ready-to-wear fabrics in the form of t-shirts, scrafts, and tote bags. Gulijat cloth can increase creativity and high artistic value, the technique of binding the cloth is the main factor that determines artistic value. in the following picture is the result of the MGMP exploration of arts and culture in Gresik district.

Figure 4. The results of the Gulijat technique

(dok. Budi Defri, 2023)

Innovative teachers tend to use learning methods and approaches that are more interesting and relevant to students. This can increase students' motivation to learn and encourage their interest in the subjects taught. Apart from that, innovative teachers often encourage students to participate actively in the learning process. They may use methods such as group discussions, problem-based projects, or simulations, which can help students become more engaged in learning. The application of the Gulijat technique is very suitable when applied to the learning process, especially for vocational school students.

Teachers often use educational technology, such as interactive learning software, instructional videos, or online platforms, to support learning. This can help students develop digital skills that are important in the modern world. Apart from that, there are still teachers who tend to use assessment methods that focus on abilities and competencies that are appropriate to the needs of the world of work. This can help students better prepare for their careers after graduation. Apart from innovation, providing constructive feedback to students on a regular basis can help students understand their abilities and provide opportunities to continue to improve themselves.

Developing Soft Skills through innovative learning can also provide opportunities for students to develop social skills and soft skills, such as communication skills, teamwork and problem solving. Innovative teachers encourage students to think creatively and critically. They may provide assignments that challenge students to find new solutions to problems or develop creative ideas. The positive influence of teacher innovation in learning can have a big impact on students' abilities in vocational schools. This can help them become better prepared for the world of work or continue their education to a higher level. Therefore, it is important for schools and teachers to support innovation in the learning process.

CONCLUSION

The application of the gulijat technique provides new innovations for the MGMP Arts and Culture Vocational School in providing learning innovations to students, apart from

that it also increases the abilities and creativity of Gresik Regency Vocational Arts and Culture MGMP training participants. The results obtained from the training are that the application of gulijat is not only applied to fabric but can be applied directly to other textile products such as t-shirts, bags, headscarves or pillowcases. Partners have been able to practice creating the Gulijat technique according to the correct procedures and the products created show clear motifs by combining the Roll technique, tie technique, sewing technique so that the motifs are more varied. After participating in this training, it is hoped that the Gresik Regency Vocational School Arts and Culture MGMP participants will be able to teach and develop these techniques to students in their respective schools.

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Benalu as a Material for the Creation of Three-Dimentional Fine Art Works

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Fine arts
Applied arts

ABSTRACT

In Unesa's visual arts education programme, all students must take the 3-Dimensional Basic Art course as a basic art course. The benalu tree as an alternative material to create 3- dimensional works of art. The objectives of this research are: (1) to describe the process of making 3-dimensional artworks from benalu material (2) to create 3-dimensional artworks from benalu material. Benalu has various shapes and sizes, so it is relatively easy when used to create 3-dimensional works of art, both in the direction of pure art and applied art. This research uses the creative method of 'Design Thinking' (Hendriyana, 2022) through exploration and experimentation of materials, shapes, sizes, techniques and construction. This research refers to the form of art practice led research conducted by students of the fine arts education programme class of 2022. The results of the research are; (1) the process of making works by preparing tools consisting of ladders, axes, saws, knives, sickles/clurit, ropes, and poles. Necessary materials, benalu, wood glue, wood politur, water, cotton, wood sandpaper, cloth, clear paint. (2) Created 4 3-dimensional artworks with the titles 'Parasite' (Berliana Ayomi), 'Animal' (Cyiko Felicia), 'Mushroom' (Diana Bella), 'Dancing' (Lucky Gozali).

INTRODUCTION

In the visual arts department of the FBS Unesa visual arts education study programme, all students must programme a 3-Dimensional Basic Art course as a basic art course that needs to be mastered. In the next semester students will programme a 3-Dimensional Fine Art course which is an application of the previous course. To add to the experience, students need to explore materials, forms, techniques, finishing and so on so that the works produced are more varied, explorative and aesthetic. Many fine arts students are less interested in this course, so it is necessary to appreciate various forms of 3-dimensional artworks with various materials, techniques and finishing. They assume that 3-dimensional artworks can only be created with wood, metal, stone, clay, fibre-glass, and so on. In fact, there are many other materials around us that can be used to create 3-dimensional works of art, one of which is benalu.

Benalu is a plant that hitchhikes on other plants and sucks nutrients or food from the plants it hitchhikes on [1]. Generally, the public considers that benalu plants are detrimental. This is because they attack and damage various types of plants, whether plantations, agriculture, or landscaping. They take nutrients from the host plant, so the main plant does not get enough nutrients. Thus, the main plant becomes infertile, unproductive and can even die. The existence of a parasite is disturbing and detrimental [2]. Therefore, it is not uncommon for people to try to get rid of the parasites from their plants, either using synthetic or natural pesticides. But in fact, plants that are considered parasites still have benefits, including functioning for health / herbal medicine [3] and as

materials for making works of art.

Artworks created from benalu plant materials are still rare, so it is rather difficult to find references/libraries and materials. Fine arts students in the process of creating art must 'have an aesthetic experience', by processing rare materials into high artistic value. The work ethic in creating art needs to be instilled in students so that their potential and talent can be seen during practical lectures in the studio, especially in creating 3-dimensional art.

[4], Fine Arts FBS, State University of Padang about shrews in surrealist painting [4]. The results of the visualisation of human behaviour like a shrew reveal that many people in the environment cannot distinguish between which one acts as a shrew and which one acts as a host, resulting in bitterness, misery, towards small people due to the existence of these harmful people. There is a closeness to this research although the type of art product produced is different. This research is more concerned with the meaning and philosophy of the work than with the product of the work. The clear difference is that this research is 2-dimensional and what the researcher will do is the creation of 3-dimensional works towards fine art.

[5], majoring in Fine Arts, Faculty of Letters, State University of Malang, visualisation of benalu plants as inspiration for graphic arts. The benalu plant is a depiction of the bad side of humans. This contemplation makes an understanding that benalu plants are a philosophy of life that not only humans attack each other, but also plants are often attacked. So that as creatures we should be able to fortify ourselves and start goodness from ourselves so as not to become a parasite for others. Through graphic artworks, it is inspiring to explore and visualise the shape of a benalu plant and pieces of human figures as a form of expression taken from a sense of anxiety about human nature that is similar to a benalu plant to provide inner encouragement and character education to the community not to be too dependent on others. In terms of meaning, this is also similar to this research. The difference is that it focuses more on the creation of 2- dimensional artworks with graphic art, which is more directed towards pure art, while in this research it is more about the creation of 3-dimensional artworks.

[6], majoring in Fine Arts, Faculty of Art and Design, Universitas Negeri Makasar, on making crafts from benalu material. The results of the creation of this work are quite interesting, because the benalu tree is used as a flower arrangement art product. So this work must be combined with other materials, such as flowers both wet and dry, leaves, wood, stones and so on. These materials and accessories are glued together and constructed into a useful decorative product. This work is closer to wearable art. There are similarities and differences with the materials that will be examined. The similarity is to create fine art products from benalu material and the difference is that this research will create three-dimensional fine art.

Three-dimensional or trimatra works of art are works of art that have dimensions of length, width, and height, or in other words, have depth (volume/shape) in addition to length and width, so that their form can be enjoyed from various directions. Works of art that belong to this group include sculptures, buildings, dolls, and various types of product designs [7]. Meanwhile, according to [8] three-dimensional fine art is art that is plastic in shape or form. The plastic that is meant is that it can be seen touched and enjoyed through physical eye sight. This condition makes three-dimensional art a

complex art discussion. Thus, 3- dimensional works of art have a certain form or shape, volume and occupy space. Based on its function, 3-dimensional art can be divided into; (1) Pure works of art are works of art created solely with the intention of fulfilling the need to express a sense of beauty (aesthetic sense), not intended to fulfil a practical use or function. Examples of works of art that belong to this group are paintings, sculptures, tapestries, or other works of art produced by artists solely for aesthetic expression. The term pure fine art appeared for the first time in Europe during the Renaissance Period [8]. (2) Applied works of art are works of art created with the intention of fulfilling certain practical functions or uses. The usability aspect is the main factor underlying the creation of this type of artwork. This means that this work of art was born because it is driven by the desire to fulfil practical needs in order to facilitate and provide comfort for humans in their lives. In an effort to fulfil these practical needs, humans also want to be satisfied with their aesthetic taste so that the process of realising it is sought so that the work is attractive to the eye.

RESEARCH METHODS

The method of creating 3-dimensional artworks with benalu materials uses the creative method of 'Design Thinking' through exploration and experimentation of materials, shapes, sizes, techniques and construction [9]. Exploration of the idea of materials to be used requires sensitivity and sensibility to the existing potential. Therefore, the flow of the practice led research method can be conveyed as follows [10]; data collection is carried out from field studies. This data collection technique was carried out through field observations and literature studies. Observation is carried out by collecting data on the characteristics of benalu materials/materials, forms that are suitable for making 3-dimensional works of art [11]. The material was obtained from various trees on which it lived until it grew so much that it outgrew its host tree. The search for the benalu tree was assisted by the students of the basic 3-dimensional art course, as an assignment in the course. Various experiments that explore benalu as a material to create 3- dimensional works of art were carried out by students of the fine arts education programme class of 2022. The exploration of the benalu tree as a material for creating art is expected to produce new, unique and aesthetic 3dimensional works of art. Thus the problems in this study are; (1) how is the process of making 3-dimensional artworks with benalu material? (2) how are the results of 3-dimensional artworks with benalu material ?.

RESULTS AND DISCUSSION

The process of making 3-dimensional artworks with benalu material requires preparing the necessary materials and tools. Benalu that grows attached to other trees, such as; in mango trees, teak trees, acacia trees, sono trees, tiara paying trees, sengon trees, guava trees, blimbing trees and so on, as raw materials for the creation of 3- dimensional works of art. As the name implies, the benalu tree is parasitic to the tree it occupies. It always clings to and sucks food from the plant it is on. If it is not destroyed immediately, the benalu tree will flourish and suck food from the main tree (host) which can eventually die [12].

If the main tree is dead, then actually the balu tree will also die, because the food delivery from the main tree has stopped. The balu that sticks to plants that are already

thin, half-dead and even dead is actually easy to take as a basis for making 3- dimensional artworks. The material from various places is still natural and irregular, so it needs to be cut into pieces as needed. This is where the beginning of the creation of the 3-dimensional form that will be made has appeared. The supporting materials are: wood glue, G glue, wood polish, water, cotton, wood sandpaper, cloth, clear Pylox paint.

The tools needed when searching for baluch material in trees include ladders, axes, saws, knives, sickles/clurit, ropes, poles, and so on. This equipment adapts to the material attached to a particular type of tree. Benalu that has just been obtained from the tree is still raw and not yet dry, so it needs to be dried first in a shady place not directly exposed to sunlight, so that the branches are not easily broken. It takes 1 - 2 months for the balu to be completely dry and ready to be processed. When the benalu is dry, equipment is needed, including; small saws, sharpening knives, branch cutting scissors, wood carving chisels, sandpaper, brushes, cans and so on.

The process of making a 3-dimensional work of art from benalu material requires concentration, accuracy and thoroughness, in order to produce a good work. Consideration of forms that can be seen from various directions is one of the main things, in order to get a dynamic and aesthetic form. The direction of the formation of depth, length, width and height are the main elements in forming the volume of a 3-dimensional work of art. The steps of the process; (1) Sorting and selecting the benalu and its branches, the bad ones are cut, while the branches that look aesthetically pleasing are retained. (2) Peeling off the bark to reveal the texture of the wood. (3) Carving the benalu tree to get the shape of the trunk and branches according to the desired 3-dimensional shape. (4) Coating the benalu with melted wood glue, in 3 layers. (5) After the benalu dried, it is coated with 2 layers of politur. (6) Drying the benalu in the sun until it dries. At this stage, the benalu as the material of creation has become a 3-dimensional work of art.

The results of the creation of 3-dimensional works of art from the benalu tree. The creation of 3-dimensional artworks from benalu tree material went through several stages, namely; (1) finding benalu trees as raw materials, (2) making designs, (3) exploring benalu trees into 3-dimensional artworks. In the design process, there are about 3 - 5 designs that are made as the basis for making the work. From these sketches, only one was chosen as the basis for the creation of a 3-dimensional work of art from the benalu material. The design sketches are not shown here in order to focus more on the benalu artwork, among others;

1. Benalu's work entitled; 'Parasite'.

This work is derived from the material of a parasitic tree attached to a teak tree. Based on the title of the work, 'parasite' has several meanings, among others;
In the context of biology, "parasite" is an organism that has a parasitic relationship with its host. Parasitism is a form of interaction between organisms, where one organism (the parasite) takes advantage of another organism (the host) by harming the host. The parasite uses the host to gain nutrients, protection, or other resources, and often this is to the detriment of the host.

Figure 1. Title; Parasite. Work ; Berliana Ayomi (2023).

In common parlance, in everyday conversation, "parasite" is also used in a broader context to describe individuals or entities that take advantage or resources from others without making an equal contribution or inflicting harm on others. For example, in an economic context, "parasites" can refer to companies or individuals who benefit from the system without contributing fairly. In a health context, "parasite" refers to an organism that can infect humans or other animals and cause disease. It can be an internal parasite or an external parasite. In the world of computers and technology, "parasite" can refer to software or programmes that infect computer systems or other devices, often with the intention of damaging or taking control of those systems.

2. Work titled; 'Animals'

Figure 2. Title; Animals. Artwork ; Cyiko Felicia (2023).

This work is derived from the material of a bole tree attached to a mango tree. In the context of the title selection, "animal" includes various types of animals, whether they live on land, in water, or in the air. These animals share common characteristics such as the ability to move, the lack of cell walls, and the need to consume organic food to survive. Animals vary greatly in their shape, size, and behaviour. They can include large animals such as elephants, lions and whales, to very small animals such as insects and microorganisms. Animals have important roles in natural ecosystems, including as predators, plant eaters, pollinators, decomposers of organic matter, and many more. Different types of animals, their behaviour and ecology are important for the preservation and maintenance of ecosystem balance. Animals can be interpreted from

various perspectives;

Animals: a term used to refer to various types of animals that live in the wild or that are not domesticated by humans. This includes wild animals that live in forests, grasslands, oceans, and other natural places. Conservation: in relation to nature conservation and preservation "wildlife" refers to animals that live in the wild and not in captivity or under human control. Wildlife conservation is the endeavour to protect and sustain populations of these animals in their native habitats. Environment: the balance of ecosystems, "animals" are important components of food webs, and their role in ecosystems can be crucial to maintaining the balance of nature. Proverbs or expressions: the word "animal" can also be used in some proverbs or language expressions to describe wild, uncontrollable, or violent behaviour such as that of an animal.

3. The work titled; 'Mushroom'

Figure 3. Title: Mushrooms Works: Diana Bella (2023)

This work is derived from the material of a balu tree attached to the branch of a rosewood tree. The choice of the title 'Fungus' is related to the similarity of the form of the work to the type of fungi in biological terms. Fungi do not photosynthesise: one of the main differences between fungi and plants is that fungi do not photosynthesise, do not have chlorophyll and cannot produce their own food from sunlight. Instead, fungi usually obtain nutrients by decomposing dead organic matter or living as parasites on other organisms.

Hyphae: the main body of a fungus is made up of a connective tissue called "hyphae". Hyphae are thin threads that can grow in a branching manner and form a network called mycelium. Mycelium can develop in the soil, on organic matter, or on the host if the fungus is a parasite. Ecological role: fungi have an important ecological role in the ecosystem. Fungi are the primary decomposers of dead organic matter, helping to break down these materials into nutrients that can be used by plants and other organisms. Some

fungi also form symbioses with plants, such as mycorrhizal fungi, which help plants absorb nutrients from the soil. Despite their benefits in various aspects of life, some types of fungi can be toxic and harmful to humans and animals.

The meaning of mushrooms in a culinary context, refers to the type of food that comes from various types of edible mushrooms. Mushrooms can be cooked and processed into a variety of dishes, such as grilled mushrooms, mushroom soup, or sautéed mushrooms. Fungal diseases can refer to fungal infections in humans, animals, or plants. These are diseases caused by pathogenic fungi that can damage health. Examples of fungal diseases in humans are; ticks, ticks, ringworm, and so on.

4. Work titled; 'Dancing'

Figure 4. Title: Dancing. Artwork: Lucky Gozali (2023)

This work is derived from the material of a benalu tree attached to a mango tree. The choice of title is also related to the similarity of the benalu work with dance. Dancing is an activity that has existed in various cultures around the world that have various specific styles, genres and traditions.

Dance has deep meaning in various contexts, depending on the views of the individual and the culture in which it is performed, among others: Personal Expression: Many people express themselves through dance. Dance can be a means to express feelings, thoughts, and personal identity. It is a way for dancers to communicate with themselves and others without words. Emotional Expression: Dance is a powerful form of emotional expression. In dance, dancers can express happiness, sadness, anger, joy, and a variety of other feelings. The body movements and facial expressions in dance can be a channel to release and manage emotions. Cultural Expression: In many cultures, dance is a way to celebrate and maintain cultural heritage. Traditional dance often reflects the values, history, and cultural identity of a group or community. It is a way to maintain and pass on traditions from one generation to the next. Fitness and Health: Dance is a form of physical activity that can improve physical fitness and health. It involves body movements that can improve balance, flexibility, muscle strength and coordination. Many people dance as a way to keep their bodies healthy. Performance and Entertainment: Dance is often used in the context of performance and entertainment. It can be part of a theatre performance, music concert, sporting event, or other performing

arts. In this context, dance is meant to entertain the audience and provide an interesting visual experience. Art Education: For many people, dance is a valuable form of art education. They take dance lessons to learn more complicated dance techniques and develop their art skills. It can also involve the study of dance history and various dance styles. Contemplation and Meditation: Some forms of dance, such as meditation dance or highly ritualised dance, are used as a means to achieve contemplation and equanimity. It is a way to connect with the spiritual or introspective aspects of oneself. Shared Experience: Dance can also be a profound social experience. When people dance together in groups or communities, it can strengthen social bonds, celebrate special occasions, or commemorate important events..

Developing Soft Skills through innovative learning can also provide opportunities for students to develop social skills and soft skills, such as communication skills, teamwork and problem solving. Innovative teachers encourage students to think creatively and critically. They may provide assignments that challenge students to find new solutions to problems or develop creative ideas. The positive influence of teacher innovation in learning can have a big impact on students' abilities in vocational schools. This can help them become better prepared for the world of work or continue their education to a higher level. Therefore, it is important for schools and teachers to support innovation in the learning process.

CONCLUSION

Based on the results of the discussion above, it can be concluded that; (1) The process of making the work: preparing the necessary materials and tools. Materials needed; benalu, wood glue, wood polish, water, cotton, wood sandpaper, cloth, clear paint. Tools required include; small saw, sharpening knife, branch cutting scissors, wood carving chisel, sandpaper, brush, tin can. Manufacturing steps: sorting and selecting good benalu material, skinning the material and branches. Shaping, carving and coating the benalu with wood politur. After drying, the centipede as the material of creation has become a 3-dimensional work of art. Benalu materials of various types can be made into interesting 3-dimensional works of art. After going through the concept of sketching and choosing the best design, finally a 3-dimensional artwork can be created from the benalu tree material. Based on the above discussion, 4 3-dimensional works of art are represented here with the titles 'Parasite' (Berliana Ayomi), 'Animal' (Cyiko Felicia), 'Mushroom' (Diana Bella), 'Dancing' (Lucky Gozali). Various types of mistletoe materials can be transformed into intriguing three-dimensional artworks. After going through the conceptual sketching phase and selecting the best designs, three-dimensional artworks made from mistletoe materials can finally be created. Based on the discussion above, here are four representative three-dimensional artworks entitled 'Parasite' (by Berliana Ayomi), 'Fauna' (by Cyiko Felicia), 'Fungus' (by Diana Bella), and 'Dancing' (by Lucky Gozali).

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Investigation of Academic Services in Accounting Students

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Teaching Evaluation

ABSTRACT

The purpose of this study is to see academic services to accounting students. Collecting data using a questionnaire which distribute to respondents. Data collected as many as 154 respondents. This study used data from students of the Bachelor of Accounting Study Program, Faculty of Economics and Business, Surabaya State University. Academic services in teaching planning, teaching implementation, teaching evaluation provided to accounting students have been going well, so it is hoped that there will be an increase in the teaching and learning process and the quality of education in tertiary institutions.

INTRODUCTION

Improving the quality of higher education must be carried out by higher education providers, both higher education organized by the government, the private sector and the community [1], [2]. Higher education in accordance with its vision and mission is an institution that cultivates and produces superior human resources as a bridge in producing quality products to be able to compete in the global market. Students are a vital and central element in a tertiary institution. Higher education has an interest in fulfilling various dimensions of satisfaction, especially for students in order to realize quality output so that they can make the best contribution in their community service.

Students are core stakeholders because they are interested parties and are directly influenced by the learning and management of tertiary institutions. The users of graduates (end users) and the community (social) are stakeholders who have an interest in the results of the real contributions of lecturers and staff, students and alumni. Important contributions made by lecturers and staff are learning services, management and provision of adequate lecture facilities, guaranteed security and a comfortable campus life and environment for students.

The quality of academic services is very important in educational institutions. Academic services are said to be of quality if they are in accordance with the needs of their customers. While the quality of academic services is the value given by customers to what extent academic services are provided. Customers, in this case students, will say that quality academic services are in accordance with their specifications. [3], [4] states that there are five main dimensions to express service quality, (1) tangibles, (2) reliability, (3) responsiveness),(4) assurance (assurance) and (5) (empathy). Good public services must consider the quality side formulated that the quality of service as:

"A dynamic condition associated with products, human services, processes and the environment that meets or may even exceed expectations. Service quality is also defined as something related to the fulfillment of customer (community) expectations/needs, where service is said to be of high quality if it can provide products and or services

according to the needs of customers (community)."

Other experts, namely [5], [6], [7], [8] see the quality of service from various aspects, namely:

> "The customer (community and consumer) perspective, from the basic point of view of the product, from the point of view of its basic use, and from the point of view of its basic value. From the customer's point of view, of course the quality of service boils down to satisfaction. From the point of view of the product, of course there are specifications for each service, while from the basis of usage it means the level of conformity with the wishes of the customer/consumer/community. In the end, from the basis of value, service quality is the relationship between usefulness/satisfaction with the price that must be paid by the customer/consumer/community. From these two experts it can be concluded that service quality should be able to meet the needs of customers, and the target of service management is customer/consumer/community satisfaction."

According [9] [10] [11], [12], [13], efforts to provide quality services will be carried out with quality, including must contain the following elements:

a. Simplicity, service procedures can be carried out easily, smoothly, precisely, not convoluted, easily understood and implemented by the customer/community.
b. It is the full responsibility of the service officers to provide services in a timely manner, to contact the customer/community as soon as possible, if something happens that needs to be notified immediately to the customer/community.
c. Reliability, including consistency/consistency of performance that is maintained and maintaining interdependence/integration between service providers and customers/community, such as maintaining the accuracy of calculating money/accurate costs in recording data (good information system), and on time, on time, on quality, on time the quantity.
d. The skills/reliability of service officers, by mastering the skills and knowledge of the services needed according to the type of service they provide.
e. Close to customers and ease of communication, not only face to face, but by using appropriate advances in information and communication technology.
f. Friendliness, which includes patience, attentiveness, empathy, friendship, between officers and customers/people served, although it doesn't need to be excessive.
g. Transparency, customers/community can find out all the information they need easily, including procedures/procedures, conditions, service completion time, costs, and so on
h. Smooth and continuous communication between officers and customers/community, so that any changes can be informed in advance (customers/community are not surprised by sudden changes, without prior notification).
i. Credibility, both service officers and customers/community served, so that an atmosphere of mutual trust can easily be built.
j. Clarity and certainty of service, so that customers/community can easily understand the services provided with all the consequences.
k. Service security, so that customers/community feel safe, free from worries and

dangers, as well as unnecessary risks from the services provided.

l. Understand what the customer/community expects. Trying to understand, understand, seek, learn what are the service needs expected by the customer/community being served.
m. Real, everything is real or well-defined, for example equipment, sufficient and reliable officers, clear identity, and other supporting equipment.
n. Efficiency, that service is only limited in the context of the thing being served so that it can run well.
o. Economical, both time, cost and effort, according to the type/category given.

According to Tjiptono "Higher education as an educational institution to be accountable and of quality is required to provide quality academic services. Universities as a service industry must start to think about the importance of customer service in a more mature manner, because now it is increasingly realized that customer service and satisfaction are vital aspects in order to survive in business and win the competition. Quality is something that is dynamically constantly moving, if it moves forward it is said there is an increase in quality, if it moves backwards it is said to be of quality. Quality can mean superiority or excellence, that is, exceeding the generally accepted standards. Something can be said to be of quality if there is a match between the requirements of the object or service that requires it.

Meanwhile, Service quality is the extent to which the services provided by the company match the needs and expectations of customers. The quality of academic services is the value given by the customer to the extent that the academic services provided are in accordance with customer expectations. Customers, in this case students, will say that academic services are of high quality if they meet their specifications. The quality of academic services in this study is the value given regarding how well the academic services provided by the administrative academic bureau are able to meet student expectations.

Stated Service quality is a quality that emphasizes more on the word customer, service, quality and level or level. The best service to customers (excellent) and the level of service quality is the best consistent way to meet consumer expectations (external service standards and costs) and the service performance system (internal service standards, costs and benefits). Quality is a concept that is difficult to define, so that different definitions are found by different experts. That way service quality can be the ability of a service to meet the needs and expectations of consumers (students). Quality has eight measurement dimensions consisting of aspects namely, 1) Performance, 2) Product Features, 3) Reliability, 4) Conformance, 5) Durability, 6) Serviceability, 7) Aesthetics, and 8) Perceived quality." According to Oliver "Satisfaction is an evaluation of the surprise that is inherent or attached to the acquisition of a product or consumption experience. A service is considered satisfactory if the service can meet the needs and expectations of service users. Academic services for accounting students include planning, implementing and evaluating teaching.

Table 1. Data on graduates of accounting students per year in ASEAN countries tables.

No.	Countries	*Number of accounting graduates*
1.	Indonesia	35.000
2.	Thailand	20.000
3.	Philippina	15.000
4.	Malaysia	5.000
5.	Vietnam	2.000
6.	Laos	1.080
7.	Singapura	1.000
8.	Brunei	250

Source: World Bank, 2014

Based on Table 1, by graduating 35,000 accounting students, it means that in this case Indonesia contributes 45% of all ASEAN accounting student graduates. One of the universities in Indonesia that has contributed to graduating accounting students is Surabaya State University. Surabaya State University is one of the tertiary institutions that has an accounting study program by continuously trying to produce quality, reliable, and able to compete with graduates from other tertiary institutions. Accounting Graduates on State University of Surabaya have been able to demonstrate their expertise in the field of accounting, so that many of them are accepted in various business sectors, both government and private. Soft skills in accounting work include (1) Easy adaptation, (2) Thorough, (3) Loyal, (4) Problem solving. This research uses a quantitative approach.

According to Anastasia D (2001), academic services are educational services that are directly related to students and universities as service providers which include curriculum determination, syllabus design, lecture quality design, presentation of material and teaching, mentoring, and evaluation of results. Academic services One part of academic services is academic services related to lectures (teaching) which includes elements of lecturers as teaching staff (service providers) to students. Lecturers are considered as a whole that synergistically contributes to the educational process in tertiary institutions as educational center. In addition, academic services are also defined as systematic educational efforts to provide facilities for students to master the curriculum through the teaching and learning process so that they are able to achieve the expected competency standards (Susanto, 2014). Academic services include planning, implementing and monitoring teaching. According to Marthalina (2018) the academic services provided by IPDN are very good with a percentage value of 74.87%.

RESEARCH METHOD

Collecting data using a questionnaire to distribute to respondents. Data collected as many as 154 respondents. This study used data from students of the Bachelor of

Accounting Study Program, Faculty of Economics and Business, Surabaya State University. In this study academic services include:

Teaching planning:

a. Lecturers have prepared Semester Learning Plans (RPS) and learning materials.
b. The lecturer conveys the design or scenario of online / offline lectures.
c. Appropriateness of the number of face-to-face meetings in one semester (15 meetings).

Implementation of Teaching:

a. Implementation of lectures online / offline.
b. Implementation of lectures according to schedule.
c. Conformity of lecture material with RPS.
d. Mastery of course material.

Teaching evaluation:

a. Implementation of UTS / UAS according to the academic calendar.
b. Implementation of UTS / UAS online / offline

RESULTS AND DISCUSSION

Table 2. Academic service value.

	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
D1	154	2.00	4.00	3.5714	.54661
D2	154	2.00	4.00	3.5779	.54572
D3	154	2.00	4.00	3.5584	.57151
D4	154	2.00	4.00	3.6039	.54135
D5	154	2.00	4.00	3.5714	.57003
D6	154	2.00	4.00	3.5974	.55448
D7	154	2.00	4.00	3.6234	.49938
D8	154	2.00	4.00	3.5649	.55924
D9	154	2.00	4.00	3.5779	.55757
D10	154	3.00	4.00	3.6234	.48612
D11	154	2.00	4.00	3.5974	.51791
D12	154	2.00	4.00	3.5779	.52122
D13	154	2.00	4.00	3.5974	.54256
D14	154	1.00	4.00	3.5584	.60485

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D15	154	2.00	4.00	3.6169	.51384
D16	154	2.00	4.00	3.6039	.54135
D17	154	2.00	4.00	3.6104	.51528
D18	154	2.00	4.00	3.5325	.58487
D19	154	2.00	4.00	3.5714	.59251
D20	154	2.00	4.00	3.5455	.58400
D21	154	2.00	4.00	3.5519	.59455
D22	154	2.00	4.00	3.5455	.60597
Valid N (listwise)	154				

Descriptions:

D1 = The lecturer has prepared a Semester Learning Plan and learning materials

D2 = Lecturer conveys online / offline lecture designs or scenarios

D3 = Appropriateness of the number of face-to-face meetings in one semester (15 meetings)

D4 = Implementation of lectures online / offline

D5 = Implementation of lectures according to schedule

D6 = Conformity of lecture material with lesson plan

D7 = Mastery of course material

D8 = Appropriateness of methods, media, practice/project loads with lecture objectives

D9 = Appropriate learning / study load (number of credits) with the competencies to be achieved

D10 = Ability to motivate students to learn

D11 = Giving individual / group assignments, the opportunity to ask questions, give opinions, and answer regularly

D12 = Lecturer's Appearance and Use of Indonesian is good and right in lectures

D13 = Openness to accept criticism and suggestions

D14 = Time you spend on learning activities (class lectures, structured assignments, independent study) each week in 1 credit in this course (4 = 170 minutes, 3 = between 0-170 minutes, 2 = between 170-340 minutes , 1 = more than 340 minutes) The time you spend on learning activities (classroom lectures, structured assignments, self-study)

every week in 1 credit in this course (4 = 170 minutes, 3 = between 0-170 minutes, 2 = between 170-340 minutes, 1 = more than 340 minutes)

D15 = In each meeting, fill out the lecture journal and attendance list in a timely manner at SIAKADU

D16 = Implementation of Mid Semester Exams/ Final Semester Exams according to the academic calendar

D17 = Implementation of Mid Semester Exams/ Final Semester Exams online / offline

D18 = Lecturer gives sufficient time to do assignments and objective assessment

D19 =Transparency in setting values and announcements

D20 = Willingness to give follow-up exams

D21 = Timeliness in submitting grades and announcements to students

D22 = Suitability of the material with the exam questions

Based on the results of data processing, the lecturer has prepared a Semester Learning Plan (RPS) and learning materials show an average result of 3.5714. The lecturer conveys the design or scenario of online / offline lectures showing an average result of 3.5779. The suitability of the implementation of the number of face-to-face meetings in one semester (15 meetings) shows an average result of 3.5584. The implementation of lectures online / offline shows an average result of 3.6039. Implementation of lectures according to schedule shows an average result of 3.5714. The suitability of lecture material with Semester Learning Plan shows an average result of 3.5974.

Mastery of course material shows an average result of 3.6234.Appropriateness of methods, media, practice/project loads with lecture objectives, shows an average result of 3.5649. Conformity of study / study load (number of credits) with the competencies to be achieved, shows an average result of 3.5779. The ability to motivate students to learn shows an average result of 3.6234. Giving individual / group assignments, the opportunity to ask questions, argue, and answer regularly shows an average result of 3.5974. Lecturer performance and good and correct use of Indonesian in lectures shows an average result of 3.5779. Openness to accept criticism and suggestions, shows an average result of 3.5974. The time you spend on learning activities (classroom lectures, structured assignments, independent study) each week in 1 credit in this course (4 = 170 minutes, 3 = between 0-170 minutes, 2 = between 170-340 minutes, 1 = more than 340 minutes) The time you spend on learning activities (class lectures, structured assignments, independent study) each week in 1 credit in this course (4 = 170 minutes, 3 = between 0-170 minutes, 2 = between 170-340 minutes, 1 = more than 340 minutes), shows an average result of 3.6039. Each meeting fills out lecture journals and attendance lists in a timely manner at SIAKADU, showing an average result of 3.5584. Implementation of Mid Semester Exams/ Final Semester Exams according to the academic calendar, shows an average result of 3.6169. Implementation of Mid Semester

Exams/ Final Semester Exams online / offline, shows an average result of. Lecturers give sufficient time to carry out assignments and objective assessments, showing an average result of 3.5325. Transparency in determining values and announcements, shows an average result of 3.5714. Willingness to give follow-up exams shows an average result of 3.5455. Timeliness in submitting scores and announcements to students, shows an average result of 3.5519. The suitability of the material with the exam questions shows an average result of 3.5455.

Academic services in teaching planning include (a) Lecturers have prepared Semester Learning Plans (RPS) and learning materials, (b) Lecturers convey designs or scenarios for online / offline lectures, (c) Appropriate implementation of the number of face-to-face meetings in one semester (15 meetings) goes well, proven to get a value above 3.5. Academic services in teaching planning include (a) Implementation of online/offline lectures, (b) Implementation of lectures according to schedule, (c) Conformity of lecture material with RPS, (d) Mastery of lecture material goes well, proven to get a score above 3.5 Academic services in teaching evaluation include (a) Mid Semester Exams/ Final Semester Exams implementation according to the academic calendar, (b) Online/offline Mid Semester Exams/ Final Semester Exams implementation is going well, proven to get a score above 3.5.

CONCLUSION

Academic services in teaching planning, teaching implementation, teaching evaluation provided to accounting students have been going well, so it is hoped that there will be an increase in the teaching and learning process and the quality of education in tertiary institutions.

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Systematic Literature Review (SLR) on the Effect of Animation Skill Competence on Employability

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Keywords:
Animation Skill Competency, Employability, SLR

ABSTRACT

In the world of the creative industry, animation had become one of the important things needed to produce interesting visual content. Good animation skills can increase individual competitiveness in the world of work and can also affect the chance of getting a job . This study used the SLR method to collect and analyze recent research on the influence of animation skill competency on employability. In this study, we found that individuals with good animation skills have a better chance of getting a job and can also earn a higher salary. In addition, our research showed that the competency level of animation skills was very important for increasing employability. Individuals with better animation skills tend to have the ability to produce better and more engaging content, thereby adding value to the organization. However, this study also found that other factors such as work experience and education also have a significant effect on employability. Therefore, further research was needed to study the relationship between animation skills and other factors that can affect employability. Improving the competence of animation skills can increase individual employability in the creative industries. This research can provide guidance for individuals and organizations in developing better animation skills to increase competitiveness and employment opportunities.

INTRODUCTION

21st century skills are a very important influence in the field of education, because they can guarantee students have learning and innovation skills, become users of information technology, work actively, and survive by using life skills [1] According to [2] 21st century skills express individual characteristics that become good citizens in terms of work. In addition, the main skills used in the 21st century refer to the development of a form of cognitive, behavioral, or emotional skills for school life and outside of school. In line with the opinion of [3] 21st century skills are the development of skills that are prioritized in involving creativity, innovation, critical thinking, problem solving, decision making, learning, communicative, important collaboration in the development of skills that link information technology to children's future readiness when working in field. The importance of adab 21 skills was applied in learning at school. 21st century learning had implications for development from time to time by society from primitive to agrarian, industrial, and leads to an informative society characterized by the development of digitalization [4].

In an effort to improve the quality of human resources in Indonesia, animation skills competence was one of the main focuses. One indicator of success in the development of animation skill competencies was increased employability or labor competitiveness in the job market. Therefore, a systematic literature review (SLR) was carried out to evaluate the effect of animation skill competence on employability [5].

In today's digital era, animation was a field that was growing and was in great demand by many people. In the world of work, competence in animation skills can be an added value for individuals to increase employability or competitiveness in the job

market. Therefore, research on the effect of animation skill competence on employability was very important to do [6].

Systematic Literature Review (SLR) was a research method carried out with the aim of obtaining a comprehensive and structured understanding of a particular topic or issue. SLR was carried out by selecting a large number of articles, journals and other scientific publications that are relevant to the topic under study, then evaluating and comparing these findings [6].

In conducting a Systematic Literature Review (SLR), the researcher conducted a search for studies related to the influence of animation skill competence on employability. Based on the search results, some interesting findings were found. First, there was a significant relationship between animation skill competency and employability. Individuals who have good animation skill competencies tend to have a greater chance of getting a job and earn a higher salary compared to individuals who lack animation skills. Second, the competency of animation skills required by the job market continues to grow along with technological developments. Therefore, individuals who wanted to increase their employability need to continue to develop animation skill competencies according to the needs of the job market. Third, there were differences in the effect of animation skill competency on employability between educational background and gender. Individuals with an educational background in fine arts or graphic design tend to have better competence in animation skills and find it easier to get jobs in animation. Meanwhile, female individuals tend to benefit in terms of employability because animation was often considered a more suitable field for women.

RESEARCH METHOD

This study used the Systematic Literature Review (SLR) method to identify the effect of animation skill competency on employability. This method was used to compile, analyze, and synthesize literature relevant to the research topic. This scientific article was compiled using the Systematic Literature Review (SLR) method. Systematic Research Literature Review was a research method that was carried out by collecting, reviewing and evaluating the results of previous studies related to the research topic being carried out. Systematic Literature Review research was carried out using structured and measurable steps, resulting in objective and accountable conclusions [7] which in each process follow predetermined steps.

The first stage in the SLR method was to formulate clear and specific research questions. The research question used in this study was "Does animation skill competence affect employability?" Next, the researcher conducted a literature search that was relevant to the research question using several databases such as Google Scholar, National and International Journals. The selected articles were then reviewed for quality using inclusion and exclusion criteria. After the literature was selected, the researcher conducts data analysis by identifying the findings from the literature. The results of the analysis are then synthesized to find answers to research questions [8].

Based on the results of the analysis and synthesis of the literature, this study found that animation skill competency had a significant effect on employability. Good animation skills can increase one's chances of getting the desired job. In conclusion, the Systematic Literature Review (SLR) method can be used to identify the influence of a

variable on a phenomenon. This study showed that animation skill competence plays an important role in increasing a person's employability.

RESULTS AND DISCUSSION

Based on the Systematic Literature Review (SLR) conducted, it was known that animation skill competence had a positive effect on a person's employability. Good animation skills will improve the quality of work and make someone more qualified in the eyes of the company. In addition, the use of technology in making animation also had a significant influence on employability. Companies tend to prefer candidates who have experience using the latest technology and are able to produce high-quality work.

However, SLR also found that there are other factors that affect employability besides animation skill competence. These factors include work experience, education, and other skills relevant to the position being applied for. Therefore, all of these factors need to be considered in preparing to enter the world of work.

In the digital era like now, animation is one of the fields that was in great demand by the public. Therefore, the competence of animation skills is important for someone who wants to work in this field. However, does animation skill competence also affect a person's employability? To answer this question, a Systematic Literature Review (SLR) was carried out by collecting various articles and journals that discussed the effect of animation skill competency on employability. The results of the SLR show that there was a significant relationship between animation skill competence and a person's employability.

This study showed that expertise in making animation was one of the competencies most sought after by companies. In addition, this study showed that the ability to work in a team and produce quality work was also an important factor in increasing one's employability in the field of animation.

However, several studies also showed that the level of education and work experience also had a significant influence on the employability of a person in the field of animation. Therefore, in addition to increasing the competence of animation skills, education and work experience also need to be considered in increasing a person's employability in the field of animation. Several studies have been conducted to determine the effect of animation skill competency on employability. The results of this study indicate that animation skill competence had a significant influence on a person's employability. Someone who had good animation skills competence will be more easily accepted and considered by companies in the recruitment process.

In addition, the research also showed that good animation skill competence can increase one's productivity and quality of work. The ability to create attractive and high-quality animations can help a person to complete the assigned tasks more effectively and efficiently.

From the results of the SLR, it can be concluded that the competence of animation skills had a significant influence on a person's employability in the field of animation. Therefore, to guarantee career success in the field of animation, people needed to improve the competence of animation skills and pay attention to the level of education and work experience one has.

However, the research also showed that there area were several other factors that can

affect a person's employability, such as work experience, education, and interpersonal skills. Therefore, it was important for a person to develop all the necessary aspects to increase their employability.

Table 1. Literature review.

Authors	**Title**	***Results***
Ans De Vos, Sara De Hauw, Beatrice IJM Vander Heijden, 2011.	Competency Development And Career Success: The Mediating Role Of Employability	The results supported the idea that employee participation and support for skills development initiatives was positive. There was a positive correlation with workers' perceptions of their employability.
Zheng Liu, 2021.	The Impact of Government Policy on Macro Dynamic innovation of the Creative Industries: Studies of the UK's and China's Animation Sectors	The result was the macro-dynamic innovation model of OIES that can be implemented in the animation industry, with characteristics along the value chain showing different patterns of CISS, OISS and SISS.
Paul Ayres, Nadine Marcus, Christopher Chan, Nixon Qian, 2009.	Learning hand manipulative tasks: When instructional animations are superior to equivalent static representations	Cognitive load theory was used to argue why instructional animations are more effective in teaching human motor skills than static representations. A key aspect to this argument was the role played by the transitory nature of animation and the newly discovered human mirror-neuron system. In two experiments students were taught to tie knots or complete puzzle rings either through an animated presentation or an equivalent sequence of static diagrams. In both experiments students learn more from the animation mode than the static one[9].
Mardi, 2021	Improving the Quality of Human Resources in the Field of Animation Through the PK SMK Program (Center of Excellence)	The results of this study show that the animation industry is in dire need of ready-to-use students, both pre-production and post-production. Not only skills but also work attitudes, characters and profiles of Pancasila students are important points in producing animated films [10].

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Authors	Title	*Results*
Wahyu Ariyanti, Baedhowi, Sunarto, 2017	The Influence of Mastery of Productive Subjects and Industrial Work Practices on the Job Readiness of Class Xi Students of Christian Vocational School 1 Surakarta Academic Year 2016/2017	The results showed that there was an effect of mastery of productive subjects and apprenticeship on work readiness simultaneously by 29.4%, the effect of mastery of productive subjects on work readiness by 13.69%, and the effect of apprenticeship on work readiness by 16.65% .[11]
Rolf Ploetzner a, Sabine Schlag, 2013	Strategic learning from expository animations: Short- and mid-term effects	The results of this study improved learning from different expository animations. It also led to an acquisition of knowledge which was available beyond the learning period and it equally benefited students with low and high cognitive abilities alike [11].
Fan Jia-Yia, LU Yan-Qiaoa, QU Qi-Xinga , Zhang Li, 2022	Creating Cultural Brand Equity From The Perspective Of Consumer Cognition – A Case Study Of Chinese Animation Brands	This study provides results for the construction of Chinese animation brand equity was established and also provides a new idea for the establishment of cultural brand equity management [13].
Muhammad Ihsan, 2017	Analysis of Factors Influencing Job Readiness of Students at State Vocational School 1 Sinjai	The factor that influences work readiness is the ability factor, which is the strongest factor affecting work readiness in students of SMK Negeri 1 Sinjai. This factor consists of academic achievement, level of intelligence, practical experience, discipline, expectations for entering the world of work, talent. 3) The factors that affect the work readiness of students at SMK Negeri 1 Sinjai are influenced by ability factors, academic factors, behavioral factors and self-potential, innate/inherited factors [13].

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Authors	**Title**	***Results***
Shofiyah Al Idrus, Ahmad Sonhadji, Waras Kamdi, 2016	Contribution of competency knowledge, expertise, and utilization of technology as well as entrepreneurial interests of graduates of the Animation Vocational High School (SMK) in the Field of Animation to the implementation of creative industries in Malang City (studies in the Animated Film and Interactive Games sub-sector	Based on the results of this study it was found that the quality of animation and human resource competence of animation SMK in terms of knowledge competence has an important role in the development of the animation creative industry, the higher the competence of knowledge possessed, the more influential the quality of the animation produced in the creative animation industry. Whereas expertise as the highest contribution in the creative industry is shown through the ability to draw SMK students as a determinant of animation quality.
Ade Nurhopipah, Uswatun Hasanah, Dani Arifudin, Krisno, Achmad Ferdiyansyah, Dwi Ayu Mutiara, 2020	Stimulating Children's Potential Through The Animator Talent Tour Activities.	Based on the results of this study, the evaluation of mastery of the material obtained an average success of 74%, while in the evaluation of workshops, an average success of 82% was obtained using the benchmarks determined by the organizers [14].

CONCLUSION

After conducting a Systematic Literature Review (SLR) on the effect of animation skill competence on employability, it was found that there was a significant correlation between animation skills and the ability to get a job. The study showed that good animation skills can give individuals a competitive advantage in finding work in creative industries, such as film, advertising, and video games. Apart from that, animation skills can also provide an added value for individuals who wish to work in marketing, graphic design, and social media. However, keep in mind that animation skill was only one factor that affects employability. Individuals also need to have other skills, such as communication skills, creativity, and the ability to work together in teams. Overall, SLR showed that animation skills can increase an individual's chances of finding employment in the creative industries. However, individuals also need to develop other skills in order to compete well in the labor market.

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Designing a Battery Pack for Portable Solar Generators

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Keywords:
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Generator
Portable
Disaster

ABSTRACT

Located on the Asian continent, specifically Southeast Asia, Indonesia is surrounded by four tectonic plates, the Asian plate, the Australian plate, the Indian Ocean plate, and the Pacific Ocean plate. These conditions make Indonesia a country prone to natural disasters. The impact of this disaster can result in power and communication networks being cut off, clean water and fuel being inaccessible. Portable solar generators can provide first aid related to electricity, but the batteries are very limited so the generator can only be used for a short time. The aim of making the Battery Pack is so that it can be used as an additional battery for portable solar generator so that the generator can be used for a longer time, especially in emergency situations. When given an AC load of 35 Watts, a portable solar generator connected to a battery pack can operate for 7 hours 10 minutes. When given an AC load of 55 Watts, it can operate for 4 hours 20 minutes. That is 30% and 44% longer than a generator not connected to a battery pack.

INTRODUCTION

The Sulawesi earthquake and tsunami in 2018 was an earthquake with a magnitude of 7.4 MW followed by a tsunami that hit the west coast of Sulawesi Island, Indonesia, northern part on September 28, 2018, at 18.02 WITA. The epicenter of the earthquake was 26 km north of Donggala and 80 km northwest of the city of Palu with a depth of 10 km. The earthquake shocks were felt in Donggala Regency, Palu City, Parigi Moutong Regency, Sigi Regency, Poso Regency, Tolitoli Regency, Mamuju Regency and even Samarinda City, Balikpapan City and Makassar City. The earthquake triggered a tsunami up to 5 meters high in Palu City.

As a result of this earthquake shock, the Roa-Roa Hotel on Jalan Pattimura Palu, as well as the Anuntapura Hospital on Jalan Kangkung, which has 4 floors, also collapsed. The largest mall in Palu, Tatura Mall, also collapsed. The tsunami in Palu caused a ship, the KM Sabuk Nusantara to be blown tens of meters away from Wani Harbor. The port itself was damaged as well as its docks and buildings. Also visible were the ruins of the ATC tower at Palu's Mutiara Sis Al Jufri Airport as well as damage to the port.

Clean water, electricity and fuel oil networks have become difficult to access. Communication between Donggala and Palu was cut off due to the failure of hundreds of BTS. The Ministry of Communication and Information stated that out of approximately 3007 BTS there were 431 BTS that were not functioning or 14.31%. This is because they do not have access to electricity. Several telecommunications networks from Palu to Santigi, Mamuju and Poso were cut off due to the 7.4 magnitude earthquake.

A portable solar generator is a tool that can provide first aid in supplying electrical power for evacuation after a natural disaster occurs and can be used as lighting in the homes of residents affected by natural disasters. However, portable solar generators have a weakness, the generator capacity is limited so it can only be used for electrical loads with a certain capacity in a certain time. Apart from that, the duration of use of portable

solar generators at night or when there is no sun is also limited because solar generators use batteries with limited capacity. On this basis, researchers are trying to design a battery pack that can be installed on a portable solar generator so that it can be used to help in natural disaster conditions where the electricity network is cut off after a natural disaster and the generator usage time becomes longer. With this Battery Pack, the SAR Team or volunteers can set up an emergency post where communication equipment, lighting or electrical equipment can be used.

Apart from emergencies, this battery pack can also be used for homes affected by power outages and can also to support exploration activities in forests, mountains, or the middle of the sea where there is no electricity network so that you can still charge communication devices or other equipment.

In 2014, Awangko Arshaduddin bin Awang Zainudin from PETRONAS University of Technology conducted research on portable solar power plants entitled Development of Portable Solar Electricity Generating System. However, this research is only in the form of a calculation concept design and has not been implemented.

In 2015, Debasreeta Mohanty, Saswati Dash, and Shobha Agarwal from the School of Electrical Engineering KIIT University, Bhubaneswar Odisha conducted research on electrical energy storage systems from photovoltaic systems connected to the electricity grid with a capacity of KW to MW entitled Design of Battery Energy Storage System for Generation of Solar Power. However, this research does not discuss electrical energy storage systems from small-scale photovoltaic systems or portable solar power generators.

In 2019, N.H. Ramly et al from University Malaysia Pahang also conducted research on portable solar power plants for emergencies entitled Emergency Portable Solar Power Supply. In this research, a Lead Acid Deep Cycle battery with a capacity of 14 Ah was used, where the battery is not light in weight and not small. The total weight reaches 10 kg.

In this research a Lithium-Ion battery is used, where the battery is smaller and lighter so it can be carried more easily. One of the advantages of using Lithium-Ion batteries is that when charged the charging time is fast, making them suitable for use in situations that require high mobility.

RESEARCH METHOD

This research uses an experimental research method based on calculation data and data in the field (figure 1). Borg & Gall stated that experimental research is the most scientifically reliable (most valid) research because it is carried out with strict control of confounding variables outside those being experimented with. Another definition states that experimental research is research carried out on variables for which data does not yet exist so that a manipulation process needs to be carried out by providing certain treatments to research subjects whose impact is then observed/measured (future data). Experimental research is also research that is carried out deliberately by researchers by providing certain treatment/treatment to research subjects to generate an event/circumstance that will be studied as a result. The schematic diagram of the battery pack for a portable solar generator is as follows (figure 2).

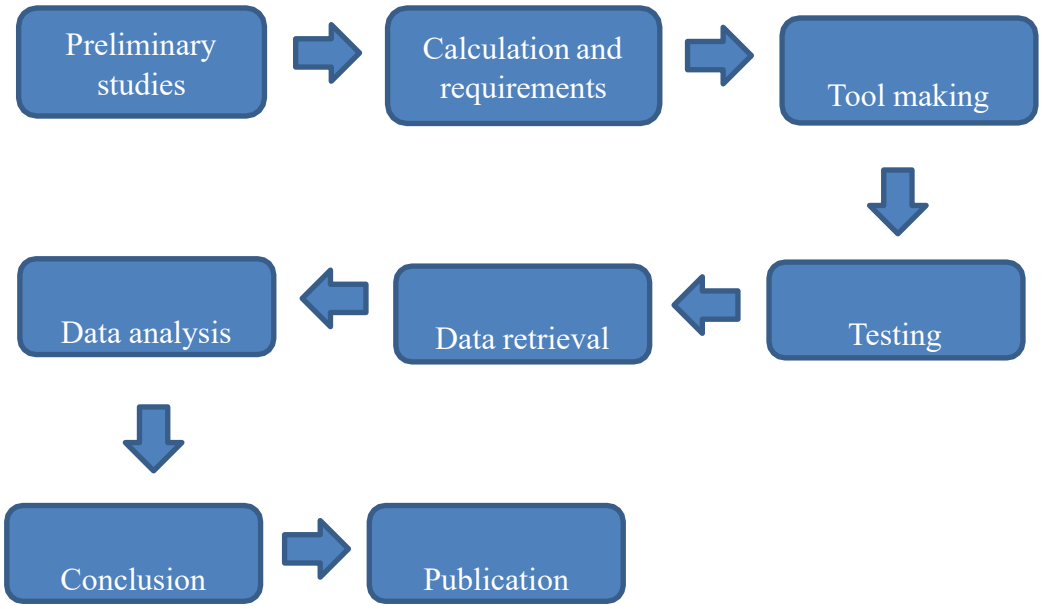

Figure 1. Research Flow Diagram

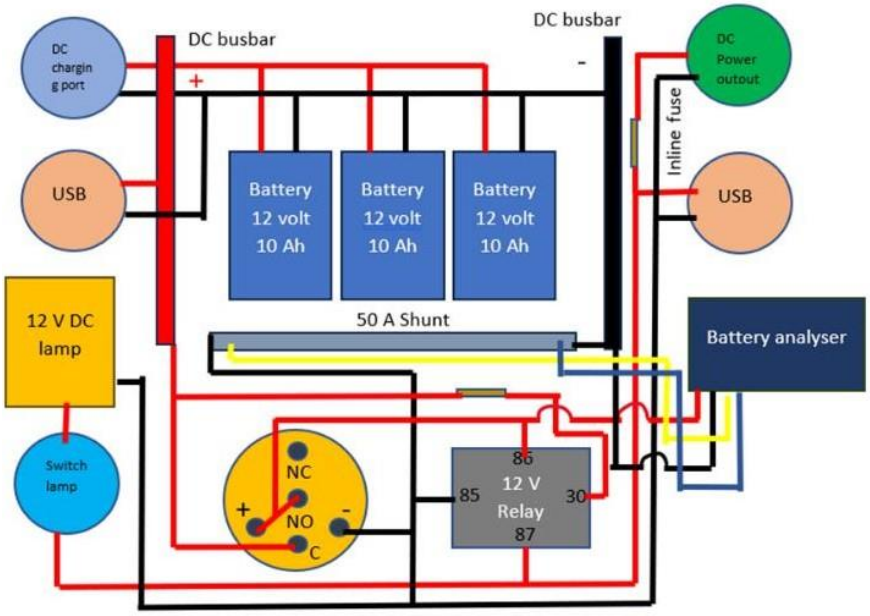

Figure 2. Schematic diagram of battery pack

The 18650-battery rating will affect the number of batteries required. The battery rating used in this research is 3.7 volts, 2000 mAh. It should be noted that by connecting the batteries in series the voltage will increase and if they are connected in parallel the ampere-hour (Ah) of the battery will increase. Because this battery will be connected to a portable solar generator which contains an inverter that requires a voltage range of 10 - 15 Vdc, the 18650-battery connected in series is 3 batteries (3S).

The battery capacity used in the battery pack is 30 Ah which consists of 3 battery packs connected in parallel where 1 battery pack has a capacity of 10 Ah with 3 batteries in series and 5 batteries in parallel. The total number of 18650 batteries required is 45 batteries. Figures 3 and 4 below are examples of batteries connected in series and parallel.

RESULTS AND DISCUSSION

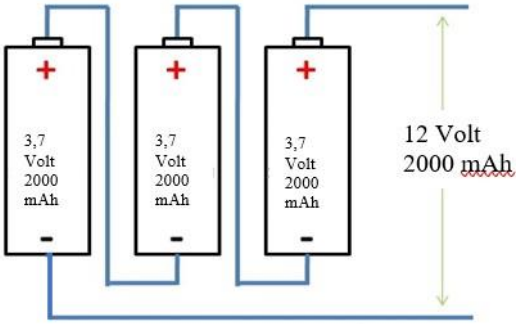

Figure 3. Battery connected in series.

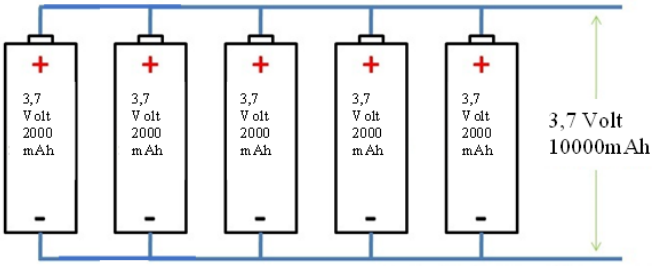

Figure 4. Battery connected in parallel.

This battery pack test is divided into three stages, loading stage, charging stage, and loading stage when connected to a portable solar generator. For load testing, a DC lamp is used with a total power of 20-Watts and a 55-watt load AC lamp via an inverter connected to the battery pack. For battery pack charging test a 12 Volt DC adapter with a current of 2 Ampere is used. The following table is the test results (table 1 and 2).

Table 1. Testing results with 20-Watt DC lamp as load.

No	DC Voltage (V)	DC Current (A)	Power (W)	Minute
1	11.9	1.66	19.8	**0**
2	11.8	1.67	19.7	**20**
3	11.7	1.67	19.5	**40**
4	11.7	1.66	19.4	**60**
5	11.6	1.66	19.3	**80**
6	11.6	1.66	19.3	**100**
7	11.5	1.65	19.0	**120**
8	11.5	1.65	19.0	**140**
9	11.4	1.65	18.8	**160**
10	11.4	1.63	18.6	**180**
11	11.3	1.63	18.4	**200**
12	11.3	1.64	18.5	**220**
13	11.2	1.64	18.4	**240**
14	11.2	1.64	18.4	**260**
15	11.1	1.64	18.2	**280**

16	11	1.63	17.9	**300**
17	10.8	1.62	17.5	**320**
18	10.6	1.62	17.2	**340**
19	10.5	1.62	17.0	**360**
20	10.2	1.6	16.3	**380**
21	9.97	1.58	15.8	**400**
22	9.42	1.56	14.7	**420**
23	**9.16**	**1.53**	**14.0**	**440**

Table 2. Testing results with 50-Watt AC lamp as load.

No	**DC Voltage (V)**	**DC Current (A)**	**Power (W)**	**Minute**
1	11.6	4.63	53.7	**0**
2	11.5	4.6	52.9	**20**
3	11.4	4.6	52.4	**40**
4	11.3	4.58	51.8	**60**
5	11.2	4.55	51.0	**80**
6	11.2	4.5	50.4	**100**
7	11	4.49	49.4	**120**
8	10.9	4.4	48.0	**140**
9	10.9	4.3	46.9	**160**
10	**10.8**	**4.26**	**46.0**	**180**

From table 1 above it can be seen that the battery pack can operate for 7 hours 20 minutes with the lowest voltage being 9.16 Volts before the lamp used as a load finally goes out. When loaded with lights with a total load of 55-Watts, the battery pack can operate for 3 hours with the lowest voltage being 10.8 Watts. This is because when testing the 55-watt load, an AC lamp load is used which is connected to the tool via an inverter. The voltage of 10.8 Volts is the cut off voltage of the inverter so that the inverter will turn itself off if the battery voltage reaches 10.8 Volts.

The battery pack charging test was carried out using a 12-volt 2 ampere DC adapter. The following is a graph of the voltage and current charging profile of the battery pack (figure 5).

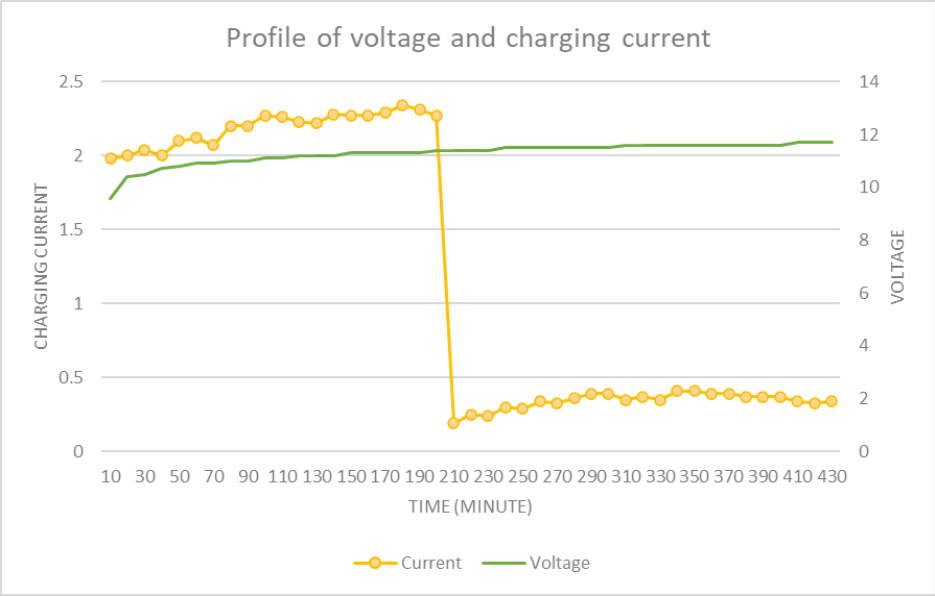

Figure 5. Battery pack charging profile.

From the graph above, it is known that the total time to charge the battery pack using a 12-volt 2 ampere DC adapter is ±12 hours. This time was obtained from direct observation during the charging process. When charging, there is a significant decrease in charging current from 2.27 A to 0.19 A. This occurs because the recharging stage of the adapter used enters the absorption phase when the battery voltage has reached 90% or 11.7-volts of nominal voltage 12.1 volts. To achieve a full charge, the battery charger/adapter maintains a constant voltage on the battery while reducing the current. The battery voltage remains constant during this stage, and the charging current gradually decreases until it reaches a low level known as trickle charge. When the battery is fully charged, the charger enters float mode, keeping the battery at a constant voltage to prevent overcharging.

CONCLUSION

From the results and discussion presented above, it can be concluded that the battery pack for portable solar generators can function well. This is known from the tests that have been carried out. The first test is that the battery pack can operate for 7 hours 20 minutes when loaded with lights with a total power of 20 watts and the battery pack can operate for 3 hours when loaded with lights with a total power of 55 watts. The greater the load power connected to the battery pack; the faster the tool's operating time will be because the battery will run out more quickly. In the second test, the charging process using a 12-volt dc 2 ampere adapter took approximately 12 hours. This is because the adapter used has several charging stages, the bulk charging stage, the absorption charging stage and the floating charging stage. When the battery is in condition 0 – 90% then the charging is in the bulk charging stage, when the battery condition reaches 90% then the charging is in the absorption stage which is marked by a reduction in charging current from 2.27 Ampere to 0.19 Ampere. The charging stages contained in the adapter aim to maintain the age and performance of the 18650 batteries used.

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Bibliometric Study of Waste Bank

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Keywords:
Bibliometric, Waste bank, Publish or Perish, VOSViewer

ABSTRACT

Bibliometrics is a statistical analysis of books, journals, articles, or other publications. Bibliometric research aims to measure outcomes, institutions, and countries of origin of researchers and map the development of scientific disciplines in new fields of science and technology. This study aims to determine trends in waste bank article writing and mapping in searching for trends in international scientific publications using the Scopus database. The bibliometric analysis method in this study was carried out using the Publish or Perish software with the keywords Waste Bank, and the article results were then grouped based on the author's profile, published article data, and the journal chosen to publish the article; then, data analysis was carried out using the VOSviewer software. This research found that for ten years from 2013-2022, articles regarding waste banks that were successfully identified totaled 92 articles. The most published articles were in 2019, with 19 pieces. The journal that has issued the most reports on waste banks is the Journal IOP Conference Series: Earth and Environmental Science which contains 21 articles. The article entitled Community-based solid waste bank program for municipal solid waste management improvement in Indonesia: a case study of Padang City has the highest number of citations, namely 41. The results of the mapping analysis using the VOSViewer software have three themes, namely "waste management policy," "solution," and "circular economy," which are still rarely researched and are the latest themes in research.

INTRODUCTION

Population growth and changes in people's consumption patterns increase the volume, types, and characteristics of waste that are increasingly diverse. Waste has become a national problem that still needs to be solved. The management still needs to face many challenges where unmanaged waste is still more significant than managed waste. Therefore, waste management needs to be carried out comprehensively and integrated from upstream to downstream to provide economic benefits, is healthy for the community, safe for the environment, and can change people's behavior (Government of Indonesia, 2008). According to Law Number 18 of 2008 concerning Waste Management, the Indonesian government emphasizes changing patterns from conventional waste management to good and environmentally sound waste management by focusing on waste reduction and handling. Waste reduction can be done using the 3R method (Reduce, Reuse, and Recycle), namely by reducing the use of items that have the potential to become waste, reusing or extending the lifespan of articles that we no longer use, and recycling items or products that are no longer used and reused into reusable raw materials.

The waste bank is one of the innovations in waste management to deal with waste problems in Indonesia. The waste bank is a concept of collecting dry waste that has been sorted by management like a bank, but what is saved is not money but garbage. This system will accommodate, sort, and distribute waste with economic value to the market

so that people get financial benefits from saving waste (Utami, 2013). The saved waste will be weighed and rewarded with a certain amount of money, then sold at a factory collaborating with a waste bank. The existence of a waste bank can change the community's stigma that waste has a value that can be utilized to become a product that has value and contains economic potential (economic opportunity). Waste banks can develop and increase public awareness of waste handling and increase the monetary value of waste to improve people's welfare (Dai & Pakaya, 2019).

Bibliometrics comes from the word Biblio or bibliography, which means book or bibliography, and metrics, which means measure. Thus, bibliometrics can be interpreted as measuring or analyzing books or literature using a mathematical and statistical approach. However, until now, bibliometrics is more widely used to measure periodicals, such as scientific magazines or journals. The bibliometric method is used to provide quantitative analytical results from written publications. This type of analysis is based on identification from a body of literature, i.e., publications in a broad sense and a particular subject area (Ellegaard & Wallin, 2015). Bibliometric studies aim to review documents or literature to describe the development of increasingly complex scientific disciplines, analyze literature related to author productivity, quote reference materials, and assist in determining or determining the use of literature. According to Uysal (In Muchsin, 2014), bibliometrics aims to provide an overview, explain, and describe the process of communication in writing through calculations and analysis. Several scientific publishing platforms that can be used as database sources for bibliometrics include Web of Science (WoS), Scopus, and Google Scholar, which have added and combined several reference capabilities.

RESEARCH METHOD

The method used in this study is a literature review with a bibliometric approach. A literature review collects several books or library materials relevant to the research's problems and objectives (Danial & Wasriah, 2009). Bibliometric analysis is an approach to examine the evolution of research domains, including topics and authors, based on the social, intellectual, and conceptual structure of disciplines (Donthu et al., 2020). Bibliometric analysis is commonly used within scientific disciplines and focuses on the quantitative study of journal papers, books, or other types of written communication (Heersmink et al., 2010). The method of bibliometric analysis in this study was carried out by defining search keywords, search results, and analyzing data.

A. *Defining Search Keywords*

A literature search was done using PoP software using the keyword 'Waste Bank'. The types of publications used in this study are limited to articles published from 2013 to 2022.

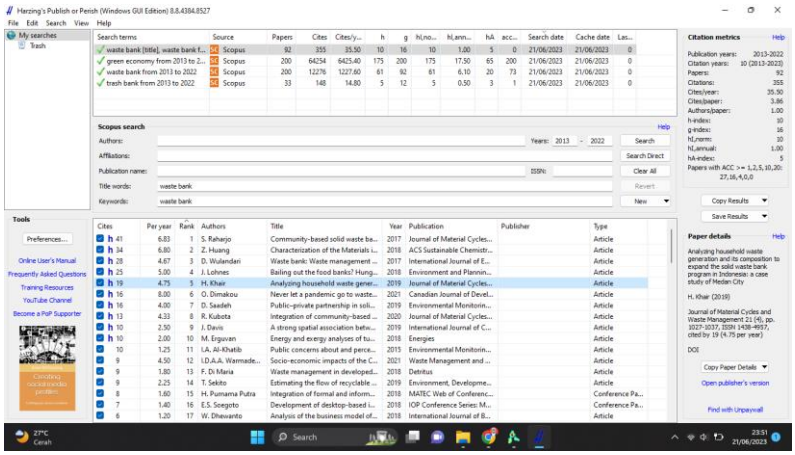

Figure 1. Scopus Database Search Through PoP

B. *Search Result*

The search results using PoP software obtained 92 articles, which will then be analyzed.

C. *Data Analysis*

The next step is to group the 92 selected articles based on published article data, author profiles, and selected journals to publish articles on "waste bank" using VOSviewer software, also to connect these groupings. VOSviewer is a software tool for creating maps based on network data and for visualizing and exploring these maps (Van Eck & Waltman, 2017).

RESULTS AND DISCUSSION

Based on the data that has been processed, the discussion is carried out as follows.

A. *Articles published in the period 2013-2022*

Figure 2 shows that from 2013-2022, articles regarding waste banks that have been identified amount to 92 articles for ten years. The highest number of article publications was recorded in 2019, with 19 articles published. The number of article publications in 2018 and 2021 was the same number publications, namely 16 articles. Article publication in 2014 found no articles published in that year.

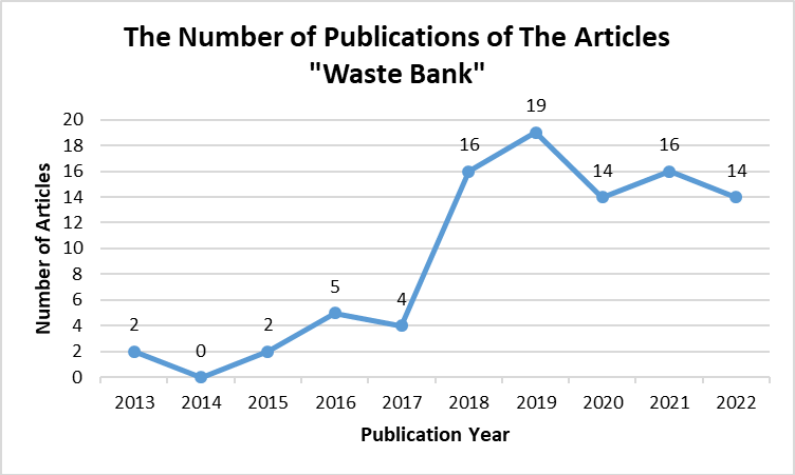

Figure 2. Number of articles on waste banks for the 2013-2022 period

B. *The Journal that Contains the Most Waste Bank Articles*

Table 1 lists the ten journals containing the most waste bank articles. It is known that the journal IOP Conference Series: Earth and Environmental Science is the journal most chosen to publish articles about waste banks from 2013 to 2022. Journal of IOP Conference Series: Earth and Environmental Science contains 21 articles on waste banks.

Table 1. The journal that publishes the most waste bank articles

Name of Journal	Jumlah Artikel
IOP Conference Series: Earth and Environmental Science	21
E3S Web of Conferences	6
Journal of Material Cycles and Waste Management	4
Journal of Physics: Conference Series	3
Environmental Engineering and Management Journal	2
Environmental Monitoring and Assessment	2
International Journal of Innovation, Creativity and Change	2
IOP Conference Series: Materials Science and Engineering	2
MATEC Web of Conferences	2
Planning Malaysia	2

C. *Article with the Most Number of Citations*

The data in Table 2 illustrates that an article entitled Community-based solid waste bank program for municipal solid waste management improvement in Indonesia: A case study of Padang City (Raharjo, 2017) is an article that has the highest number of citations, namely 41 citations. This is followed by an article entitled Characterization of the Materials in Waste Power Banks and the Green Recovery Process (Huang, 2018) with 34 citations. This is followed by an article entitled Waste Bank: Waste management model in improving local economy (Wulandari, 2017), which has 28 citations. This can be used as a reference source for further research on waste banks.

Table 2. Article with the Most Number of Citations

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No	Authors	Title	Year	Source	Cites
1	S. Raharjo	Community-based solid waste bank program for municipal solid waste management improvement in Indonesia: a case study of Padang city	2017	Journal of Material Cycles and Waste Management	41
2	Z. Huang	Characterization of the Materials in Waste Power Banks and the Green Recovery Process	2018	ACS Sustainable Chemistry and Engineering	34
3	D. Wulandari	Waste bank: Waste management model in improving local economy	2017	International Journal of Energy Economics and Policy	28

4 *Keyword Trends Analysis*

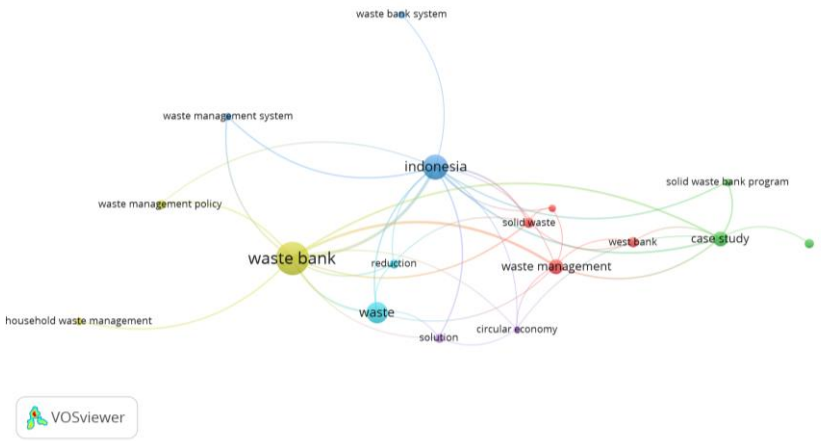

Figure 3. Circles Network Visualization

The results of the Circles Network Visualization software VOSviewer in Figure 3 show that there are 6 clusters consisting of 17 themes related to waste banks, namely:

1. Cluster 1 (in red) consists of 4 themes, namely: active waste bank, solid waste, waste management, waste bank
2. Cluster 2 (in green) consists of 3 themes, namely: case studies, waste bank programs, waste management
3. Cluster 3 (in blue) consists of 3 themes, namely: Indonesia, the waste bank system, the waste management system
4. Cluster 4 (yellow) consists of 3 themes, namely: household waste management, waste banks, waste management policies
5. Cluster 5 (purple in color) consists of 2 themes, namely: circular economy, solutions
6. Cluster 6 (Tosca color) consists of 1 theme, namely: reduction, waste

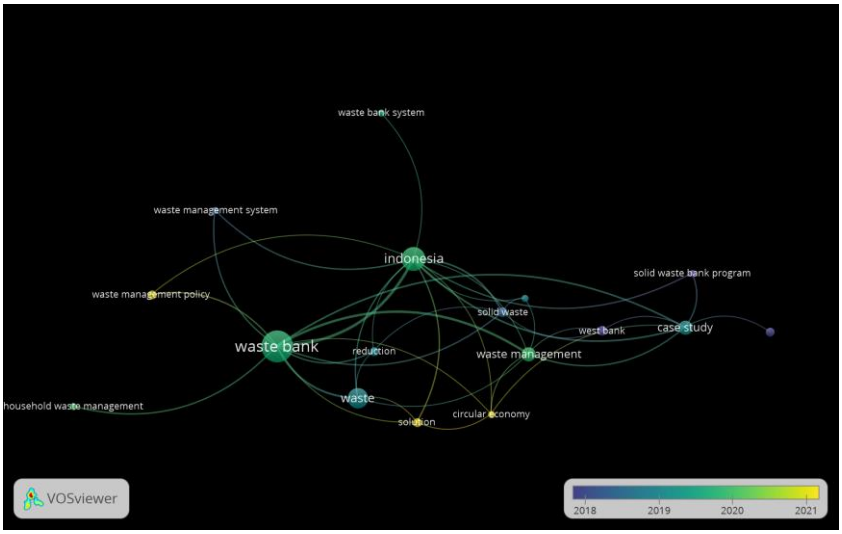

Figure 4. Circle Overlay Visualization

The Circle Overlay Visualization Visualization software VOSviewer results in Figure 4 show the trend of article writing themes in Scopus-indexed journals by year. The trend of writing article themes related to bank waste from the oldest year to the newest year is marked by purple, blue, tosca, dark green, light green, and yellow. This means that the themes "waste management policy", "solution", and "circular economy" in yellow are the newest themes related to waste banks. These themes can be updated references for further research.

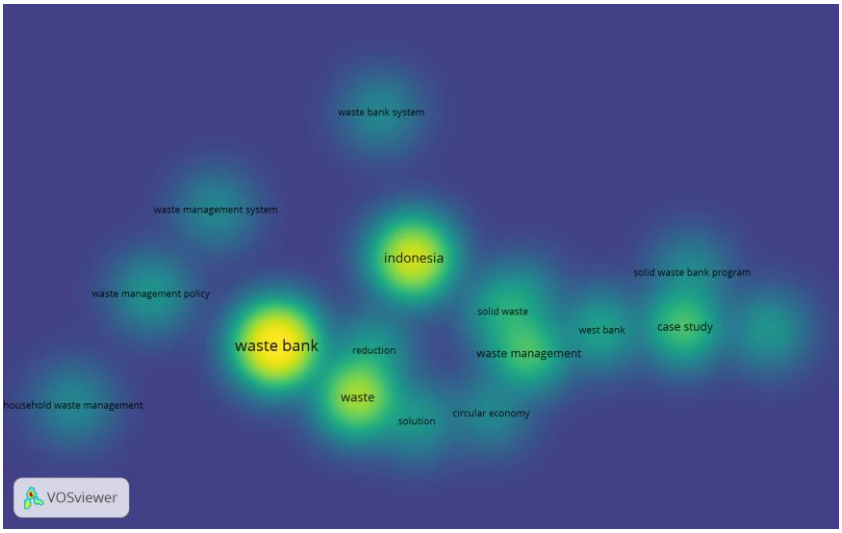

Figure 5. Density Visualization

The results of the Density Visualization software VOSviewer in Figure 5 show the density or density. A bright yellow color indicates the thickness of the research theme. The lighter the color of a theme, the more research has been done. The dimmer the color means that the theme is rarely researched. Dimly colored themes such as "circular economy", "household waste management", "waste management system", "waste bank

system", "solid waste bank program", "waste management policy", "active waste bank", " solution", "reduction" are themes that can be used as a reference for further research.

CONCLUSION

Based on the results and discussions that have been carried out, it can be concluded that for ten years, from 2013-2022, articles regarding waste banks have been identified, a total of 92 pieces. The highest number of article publications was recorded in 2019, with 19 articles published. Then, from the list of 10 journals that published the most articles about waste banks, the most chosen article from 2013 to 2022 was the IOP Conference Series Journal: Earth and Environmental Science, which contained 21 articles. In comparison, the paper with the highest number of citations is The Community-based solid waste bank program for municipal definite waste management improvement in Indonesia: a case study of Padang City (Raharjo, 2017) which has cited as many as 41 citations. The results of the mapping analysis using the VOSViewer software have three themes related to waste banks, namely "waste management policy," "solution," and "circular economy," which are still rarely researched and are the latest themes in research. This theme can be an opportunity to conduct further research.

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