



REDESIGNING INNOVATIVE PRODUCTS OF UP-CYCLE-BASED MINDI WOOD WASTE FASHION BAGS IN KREBET, BANTUL-YOGYAKARTA

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Abstract

In the industrial era 4.0 towards Society 5.0, the Indonesian government is currently intensively advancing the creative industry. Yogyakarta needs to improve its marketing management system and human resources to be strong and competitive as a storehouse of creative people and the target of world tourist destinations. Currently, creative industries have the opportunity to process local raw materials into functional products that are globally competitive. The Up-Cycle product is a fashion bag made from processed mindi wood that emphasizes the image. We are redesigning a distinctive fashion bag while maintaining the quality and uniqueness of the product in visual form, material processing, and style. The objectives of this study include (1) Redesigning fashion bag products based on up-cycle mindi processed wood waste, which can be effective in creating new, competitive SME products. (2) Implementation of the Redesign strategy through the PRN BRIN research program can build access to improving the quality of creative human resources for RUAYA SMEs as a manufacturer of UP-Cycle-based Mindi Wooden Fashion Bags in Kreet, Bantul. Applied research methods, such as R&D through a practice-based research approach by the research roadmap, focus on 'practice-based' and several empirical experiences carried out by practitioners, such as artists, designers, and innovative. Redesigning development practitioners. This research explores data through visual documentation and notes of creative practitioners to seek new understanding and find new techniques to realize ideas that can be put into practice in creating new forms of creative products, as well as visionary creative strategies that are expected to improve quality. Targeted research results include: (1) Creating design innovation through optimizing the UP-CYCLE product redesign program. Fashion bags made from processed mindi wood waste can be carried out effectively to encourage increased value for both MSMEs and their products. (2) Implementing Redesign results on RUAYA UKM products that are more highly competitive.

Keywords: Redesign, Innovative Products, UP-CYCLE, Fashion Bags, Mindi Waste

INTRODUCTION

Bantul and the surrounding Yogyakarta are known as warehouses for export-oriented craft production; of course, they are an option for academics to obtain data and community assistance to contribute to increasing quality human resources with high creativity while educating the community to be literate in technology. The creative industry still has opportunities amid the world's deadliest epidemic. SME/UMKM business actors are always enthusiastic about transferring technology, both

processing wood waste as a primary material for creating functional products and developing innovative, globally competitive designs. SME partner 'Ruaya' explores mindi wood as the primary raw material.

With the help of the CV Mitra creative team, a synergy of up-cycling products aims to produce Fashion Bags of Mindi Wood root waste materials and packaging waste (Dixon-Hardy & Curran, 2009; Malik, 2013). Following in-depth observations about up-cycled Fashion Bags of Mindi Wood, one company in Bantul, Yogyakarta, CV RUAYA, began the steps of the problem identification process. The first step was identifying teak waste features, technological processing potential, exploration, and changing teak waste material into practical works that value aesthetic aspects through an up-cycle process. Then, the up-cycled idea was incorporated by collecting visual data from design development facts, exploring references, and exploring global design trends by deepening primary and secondary data. These were finally analyzed to formulate the up-cycled concept of creating fashion bags of Mindi wood-based products for export.



Figure 1. When the Team Conducts a Survey and Obtains a Partner Willingness Letter

A work of art must reflect creative industries (Zahry et al., 2017) that genuinely symbolize the spirit of the times, not only transmit a message through a sign system communicating in visual language. Art can reflect reality, social facts, the evolution of creative and soft skills (Daud et al., 2019), and the evolution of a creative economic vision, and it can also transform reality. Also, this effort of *Ampu* transforms teak waste into aesthetically beautiful practical products through an innovative up-cycled technique. The exploration and innovation of up-cycle-based designs as creative expressions, manifesting notions, aesthetic experiences from various insights (inner views), and academic references presented to the worldwide public result in the export of excellent products. The up-cycled Fashion Bags of Mindi Wood craft industry center in Guwosari Bantul is one example of the creative industry's steady growth, which supports the production of innovative ideas and has a remarkable significance to the creative enterprise and digital business programs that can help tourism movements.



Figure 2. The process of making RUAYA fashion bags at the Workshop location

'Ruaya' is a small part of the industry that is currently focused on utilizing mindi wood waste raw material. It is included in the creative industries that care about being "environmentally friendly," so it is highly valued in markets prioritizing environmental sustainability: resources and environment. Mindi wood is in great demand by craftsmen, considering the nature of the wood, which has stable dimensions and is not easily bent. Mindi wood is straightforward when cut, sanded, and pasted. Mindi wood is often used to make special orders for small scales due to its texture characteristics, which tend to be straight and free of knots. It is often used to make doors, cupboards, chairs, and other furniture. Ruaya focuses on making fashion bags made from processed wood by prioritizing redesigning the image of a distinctive fashion bag. Ruaya focuses on maintaining product quality and unique features by continuing to innovate in developing its products. Praptayo (2010: 21) explains that mindi wood, commonly called *Melia Azedarach L.*, is a type of forest tree that is fast-growing and thriving in Indonesia.

All things organic and inorganic, physical and metaphysical, human and superhuman, of all actual manifestations of the head, heart, and soul that life is recognized in its expression, that a form always follows a function (Sullivan, 2010). The critical questions are: (1) How can the Fashion Bag Product Redesign program based on Up-Cycle processed Mindi wood waste effectively create novelty that can encourage increased value for MSMEs and their products? (2) How can implementing the redesign strategy through the PRN BRIN research program be able to build access to improving the quality of human resources, governance, and marketing and be able to improve the quality of life of MSME players producing UP-Cycle Tas Fashion products based on processed mindi wood waste in Kreet, Bantul?. The research objectives achieved include: (1) Compile analysis documents for the creation of new designs for Fashion Bag products based on Up-Cycle processed mindi wood waste that can effectively create novelty that can encourage increased value for both MSMEs and their products, (2) Create fashion bag products based on up-cycle processing of mindi wood waste that are more unique and marketable. (3) Implementing the Redesign strategy to improve the quality of human resources, governance, and marketing and improve the quality of life of MSME players producing UP-Cycle Tas Fashion products based on processed mindi wood waste in Kreet, Bantul.

METHOD AND PROCEDURES

The authors used practice-based research to create works of art, which is a method of creating art based on research findings. An intellectual artist conducts art research by observing the creative process in detail to learn new knowledge and experiences through practice. According to Biggs and Buchler (2008) and Obe and Malins (2015), the practice-based research technique will be successful if it meets the following criteria: (1) The practical activities are part of an investigation aiming to gather the information that will benefit others; (2) The research and practice results on the study subject are presented logically; (3) All information gathered is directly tied to the actual job; (4) Open and transparent study and studio practice discussed details which are structured, systematic, measurable, achievable, and explanatory; and (5) The study data and outcomes obtained through this procedure can be correctly and appropriately validated.

This research uses a Practice-Based Research approach that focuses on 'practice-based' primary focus and several empirical experiences. This is done by practitioners, such as artists, designers, and innovative design development practitioners, to bring up new concepts and methods in producing original knowledge and innovative products in practice-based research activities as an essential part of daily skill and creativity training. This research explores data through visual documentation and notes of creative practitioners to seek new understanding and find new techniques to realize ideas that can be put into practice in creating new creative product forms, as well as visionary creative strategies that are expected to improve quality. Scrivener argues that the critical difference is that practice-based research aims to generate culturally novel apprehensions that are not just novels to the creators or individual observers of an artifact. It distinguishes the researcher from the practitioner (Scrivener, 2002).

Rademaker and Polush (2022) emphasize that action research in the field implements professional development procedures for practitioner-researchers seeking to solve problems. Furthermore, this research can benefit from the intense and productive teamwork of people dedicated to their work area. Therefore, every creative process undertaken by the authors is founded on the concept of this method, allowing it to carry out innovative work processes that may be conducted directly through discovery and experimentation. Bostad (2004) asserts that when artists produce artwork, they conduct research studies in a particular language that only exists because of the presence of art. Their research will utilize specific tools and information providers to dialogue with other artwork pieces, creative people, and audiences. The use of particular media and tools during the creative process aims to interact with other works of art to compare them with those of creators and consumers. Each distinctive study pattern transforms the subject matter in the universe of thoughts through the methods and demands of particular artistic techniques. In this current study, the authors then collaborated their results with the practice-based research technique (Gustami, 2007) re-explained as the art production process remade or 'up-cycled.' He underscored that while art is intuitive, scientific approaches are well-planned, analytical, and rigorous.

Data is collected, identified, reduced, and analyzed through descriptive analytics. Data acquisition for each respondent was documented, and then a coding process was carried out, simulated in exposure according to the aspects studied and explored. A thorough data analysis process was carried out. After data analysis was carried out through tabulating research data, the research team carried out a process of reflecting on several findings with the pattern of identifying the main issues. The results of this reflection are also formulated in several recommendations for the redesign concept, the process of applying the results of the redesign, and then formulating various strategies that can implement the design strategy as an effort to improve the quality of human resources, governance, marketing, and be able to improve the quality of life for MSME players producing UP-Cycle Bags products. Fashion based on processed mindi wood waste in Kreet, Bantul. The results of the analysis and production of the results of the redesign are carried out by optimizing the inherent legal protection for intellectual property rights (IPR) for innovative products resulting from the redesign that are ready to be marketed on the global market.

RESULTS

The production process at UKM Partner "Ruaya" is from pre-design, design process, and post-production. Partner "Ruaya" is oriented toward product ergonomics as the underlying principle for products resulting from Redesign innovations that have a simple, elegant, and unique impression. These principles should be a guideline when creating excellent quality work in the ideas formed. Following are the principles of ergonomics needed in the creation of a work, namely the principles of comfort, safety, ease of use, artistry, and productivity (Dul and Weerdmesster, 2001: 20). According to Dul and Weerdmeester (2001: 20-22) the first principle of ergonomics is comfort. Convenience is a principle that is needed when using a product.

LIPI RENSTRA (2015).-2019, creating scientific inventions that can encourage innovation to increase the nation's economic competitiveness (LIPI, 2015). Government support for creative industries prioritizing local material processing and highly competitive local creative human resources. Fashion bag products are in demand as a profane and functional product that is a prospective reinforcement of today's fashion. The creative industry was one of the most influential economic sources in the world in the 2000s. It was introduced by John Howkins, where economic growth depended on new ideas (Howkins, 2001). This concept answers the question of the industrial-based economy, which has shifted from an industrial economy to a creative economy. The Indonesian government has paid serious attention to the creative industry sector through Presidential Instruction No. 6, 2009, concerning Creative Economy Development in Indonesia. The creative economy is further developed by forming a creative economic agency (Bekraf), one of the new economic sources being promoted. Many creative sectors are encouraged to complement the national economy. This was conveyed by AR R T Hidayat and A Y Asmara (2019) in the article Creative Industry in Supporting Economy Growth in Indonesia: Perspective Of Regional Innovation System in the IOP Conference

Series: Earth and Environmental Science (EES), Vol. 379, 2019 that In this term, the perspective of the regional innovation system is also essential to understand what the creative industry expects from the Government of Indonesia. Innovation and creative economy are two terms that are not separated.

Product-based creative industry activities with a touch of art through the processing of local materials and local human resources who are creative and highly competitive through exploring creative ideas and actively carrying out innovation steps on an ongoing basis. Zahry (2017: 1), in IJCCI volume 4, issue 2, March 2017, states that creative industries have been identified as a new engine of growth in that human capital, technology, tolerance, education, amenities, and infrastructure, and governance are the factors considered in locating creative industries in a city. Out of these six, this study identified tolerance and governance as the more dominant and influential factors. In general, the creative industries in various countries have a fundamental push, like in Indonesia.

The creative industry has been identified as a new engine of growth driven by the availability of human resources, technology, tolerance, education, infrastructure facilities, and governance. These factors are considered when finding creative industries (Zahry, 2017). Of all these aspects, what is needed more urgently is opportunity, access, regulation, and government support as more dominant and influential factors. The government has shown its alignment with the creative economy sector in which it provides guidance and various assistance programs for creative industry players. To date, Ruaya's bag production has nine superior fashion bag products, divided into three types of bags: backpacks, sling bags, and handbags. The artistic value of the Ruaya bag is found in the natural color of the wood combined with the color of the accessories, the color of the leather, and the shape of the bag, which is quite elegant. Making bags made from Mindi wood is a somewhat complicated process; each process requires precision to create wooden bags with a high selling value.

This investigation stage entails various efforts to investigate the visual forms and initiate various points of view and ways of expressing them. The artist, as an observer, explorer, or researcher, is obligated to gather data, facts, and 'hidden' realities about the subject under consideration to seek various insights to identify possibilities in the conceptions of ideas, form, and presentation. In his book *The Ten Faces of Innovation* (2001), Tom Kelley defines the components that steer this process with the following rules: (1) Strive for quantity; excellent, sound, and bright ideas emerge from many thoughts. Develop goals that are scored numerically with the highest possible score; (2) Promote the emergence of outlandish and extreme beliefs. Extremism has a positive value. (3) Make pictures; visuals can help inspire creativity and create new, fresher ideas (Iswantara, 2017). (4) Postpone the evaluation; by postponing the assessment, the brainstorming process occurs spontaneously and without the influence of our left brain, which is usually reasoning. There are no such things as poor ideas, so start thinking creatively and critically. (5) Take one conversation at a time, listen, be courteous, and base your decisions on the opinions of others. According to Gustami (2007), the exploration stage consists of two steps: (1) Soul-wandering steps, with field observations and extracting reference sources and

information to find various approaches for problem-solving, and (2) Procedures for investigating theoretical foundations, sources, references, and visual references which can leverage analytical materials.

The systematic review research that the researcher traced referred to a search on the <https://www.scopus.com/> page with the keyword creative industry and found several important articles, including (1) Moh. Rusnoto Susanto and Bayu Rahmat Setiadi) Imogiri Traditional Handmade Batik as a Representation of Cultural Capital in Indonesia, *International Journal of Innovation, Creativity and Change*, Vol. 14, No. 3, 2020. (2) Moh. Rusnoto Susanto, 2020, Strengthening the E-Commerce of Mindi Wood Bags Fashion Based on Design Innovation in Bantul Yogyakarta, *VISUALITA Journal, Visual Communication Design Online Journal* Volume: 9, No. 1 October 2020, (3) Moh. Rusnoto Susanto, 2019, Malay Traditional Clothes: Functional, Symbolic, Aesthetic, and Cluster State Studies, *International Journal of Recent Technology and Engineering (IJRTE)*, Volume 8 Issue-1C2, May 2019 Edition, Publisher: BEIESP, (4) Moh. Rusnoto Susanto, 2019, The Conservation of Cultural Heritage Areas of Film City in Kota Lama of Semarang, *International Journal of Recent Technology and Engineering (IJRTE)*, Volume 8 Issue-1C2, May 2019 Edition, Publisher: BEIESP, (5) Moh. Rusnoto Susanto, 2016, Product Quality Assistance for Terrazzo and Stone Sculptures in Bantul, Yogyakarta.

She was then supported by the scientific publication of Bayu Rahmat Setiadi's research team (6) in 2020. *Entrepreneurial Specialization in Creative Industries for Contractors*, *International Journal of Advanced Science and Technology*, Vol. 29, No. 4s, 2020, (7) Bayu Rahmat Setiadi, 2020, The Empowerment Model of Terminated Contract Workers as Creative Industry Entrepreneurs, *International Journal of Psychosocial Rehabilitation*, Vol. 24, no. 10, 2020. (8) Bayu Rahmat Setiadi, 2020, A Survey of Engineering Students in the Creative Industries Sub-Sectors, *Jour of Adv Research in Dynamical & Control Systems*, Vol. 12, No. 1, 2020. (9) Mita Purbasari, 2017, Potential of bamboo as material for furniture in rural areas in Indonesia, *Advanced Science Letters (Scopus)*, Vol. 23, No. 1, January 2017, (10) Mita Purbasari, 2021, A Touch of Indonesian Local Wisdom for the Concept of User Interface (UI) Design of Nusantara Traditional Wastra Digital Repository (NTWDR), Vol. 794, 2021, IOP Science <https://doi.org/10.1088/1755-1315/794/1/012120>, (11) Mita Purbasari, 2021, Architecture Design of the Nusantara Traditional Wastra Digital Repository NTWDR, Vol. 729, 2021, IOP Science, <https://doi.org/10.1088/1755-1315/729/1/012043>, (12) Ratih Pratiwi, "Corporate Strategy in Helping and Building Indonesian MSMEs in the New Normal Era" *Professional Journalism For Nations*, 2020, (13) "Tips for Companies and Organizations in Indonesia to Survive and Sustain from the Situation of the Impact of Covid-19", *Respati Indonesia University (Urindo) Jakarta*, 2020, *Inspirational Motivation, Creative Engagement, and Collaboration Agility for Global Competitiveness*, "Bounce Back Stronger: MSME Sector Resilience Strategies during a Pandemic", (15) Lusiana, 2021, *Synthesis and Characterization of Ca₃Co₄O₉ Ceramics Through the Sol-Gel Method*, *Journal of Ceramics and Glass Indonesia*, (16) Lusiana, 2019, *Multi-walled Carbon Nanotubes Reinforced-Based*

Magnesium Metal Matrix Composites Prepared by Powder Metallurgy, Materials Science and Engineering Journal.

Several scientific publications have resulted from initial research conducted in 2019-2020 concerning design innovation and strengthening e-commerce in the Mindi Wood Waste Fashion Bag product. Further research needs to be developed to re-brand innovative products of higher quality and marketable in the global market through various approaches to redesign innovation, product innovation, and marketing packaging with the target of the global millennial generation. Activities directly related to efforts to improve HR skills in the Creative Team to produce product design innovations that are unique and functional and support appearance as a complement to fashion. The assistance so far includes innovative design workshops to make Redesign breakthroughs on an Up-Cycle basis, which changes the value of mindi wood waste raw materials into export products from local waste wood. (Susanto, 2020).



Figure 3. Identify the best material for petrified teak roots & The transformation of CNC Assembly Technology accelerates the productivity of RUAYA Partners



Figure 4. Fashion bag product 'Ruaya' is marketed

The results show the analysis of efforts to improve the competence of innovative personnel with talents, skills, and creativity through the Fashion Bags of Mindi Wood up-cycled design innovation workshop program. Superior export products with high competitiveness in the global market have supported the achievement of design innovations with various explorations (ideas, forms, techniques, media, and aesthetics). Supported by the mastery of digital technology, creative and marketing

resources can strengthen these e-commerce efforts based on marketing communication. Integrating e-commerce and corporate branding into partner initiatives for future business progress becomes the next step. The Creative team at the CV Workshop location explored material specifics with their features and Fashion Bags of Mindi Wood treatment. The RUAYA Group, in collaboration with the Research Team and two Fine Arts Study Program students, closely examined the primary raw materials and opportunities for the creative process. They have developed several advanced treatment procedures for the manufacture of the primary raw material of teak root for the up-cycled Fashion Bags of Mindi Wood process into aesthetic items.

The up-cycled Fashion Bags of Mindi Wood observations focused on the research method and assisted the design innovation process based on a Form-Follows-Function technique for generating exceptional art items as export products. The CV Mitra creative team envisioned the up-cycling process using Fashion Bags of Mindi Wood root waste material. CV RUAYA used problem-solving techniques based on in-depth research of up-cycled Fashion Bags of Mindi Wood. Identification of teak waste material characteristics, technological processing potential, exploration, and the process of up-cycling teak waste material into usable works were accomplished with an emphasis on aesthetics. A handmade fashion bag with a natural touch that exposes the natural textural aspects of mindi wood. The formal shape of this fashion bag is a rectangular shape (Hulla Ballo Konsep) which looks elegant and very suitable for formal events. The combination of environmentally friendly materials, mindi wood combined with the type of access to pulp leather gives a charming impression. A redesigned ergonomically designed bag that is tailored to today's passion and fashion style.



Figure 5. HULLA BALLO & MOUNTAIN MAMMA, Mindi Wood,pul up leather, suede interior
 Ukuran: 19X12X5,5cm, 2022

Mountain Mamma handmade fashion bag with a unique shape with a natural touch that exposes the natural textural aspects of mindi wood. The formal shape of this fashion bag is a semicircle which

is perceived by Mountain (Mountain Mamma's concept) as a representation of prestige that looks elegant, very suitable for formal events. The combination of environmentally friendly materials, mindi wood combined with a type of pul-up leather access, gives the impression of elegance with contemporary passion. Bags designed for important events to show the dynamic class of today's women.



Figure 6. PENDULUM & POCAHONTAS, Mindi Wood, pul up leather, suede interior Bucket bag packaging, natural melamine finishing 27x21x7 cm, 2022

Fashion bag made from processed Mindi wood waste combined with pul up leather, suede interior, bucket bag packaging, natural melamine finishing, 27x21x7 cm, 2022 which exposes the natural textural aspects of the redesigned mindi wood. It appears in a formal form. This fashion bag is rectangular in shape (Pendulum concept) that looks elegant is very suitable for formal events and is very flexible and can be worn in various situations. The combination of environmentally friendly materials, mindi wood combined with the type of access to pulp leather gives a charming impression. A bag with an ergonomic design, the result of being redesigned with passion and the current fashion style for the career women segment aged 30-40 years. Fashion bag made from processed Mindi wood waste combined with pul up leather, suede interior, bucket bag packaging, natural melamine finishing, 27x21x7 cm, year of manufacture 2023, Fashion sling bag model bag with casual style which is processed handmade with a natural touch that exposes natural tectural aspects from mindi wood. The formal form of a fashion bag inspired by the story of Pocahontas (circa 1595–March 21, 1617), known as Rebecca Rolfe, was the daughter of a Native American tribal chief in Virginia. and sprtif appeared with a touch of ergonomic design that was redesigned according to passion and today's fashion style.

The main focus of this research is to advance knowledge about practice, or to advance knowledge in practice. Such research includes practice as an integral part of its method. (1) This research provides reinforcement of innovative designs in the form of design exploration, shape exploration, media exploration, technical exploration, and aesthetic exploration of the Fashion Up-Cycle Bag product made from Mindi Wood Waste. So that the resulting product has aesthetic strength in the appearance of products that are marketed to the global market. (Susanto, 2020). Conducting feasibility studies on

product design and production feasibility and marketing networks as well as carrying out various redesign innovation breakthroughs that provide great opportunities for global market competitiveness. To realize the solutive hypothesis, researchers develop roadmaps and technology transformation procedures to Partners.

Essentially, the emergence of an idea's conception occurs from a series of earnest, intense, and profound observations on an object or statement that result in an inter-subjective interpretation. From this perspective, soul and art is an effort to bring together ideas about Jung's relationship from the perspectives of psychology and art by providing a great new aspect to significant issues like the contribution of the picture in contemporary culture as well as the polarization of life force and substance in the visual arts (Rowland, 2008; Dougherty, 2009). This presentation is divided into three sections that challenge the reflection space and can interpret art in the world, demonstrating how Jung's concepts seek to approach the concept of art to illuminate psychological theories and aesthetic responses. The principles of beauty in a work of art, among other aspects, contribute to its creative and aesthetic value.

To develop an aesthetic structure, matters connected to forming opinions closely related to the visual form process necessitate aesthetic sensitivity, mastery of sentiments, and improvisation born from grounded or interior experience. Improvising, excavating features of form, diverse optical characteristics, creative patterns, aesthetic sharpening with technical and analytical abilities, and absolute sharpness of intuition are well worth exploring in any genre or media.

Sabana (2020) stated that (1) creativity is a person's ability to create new works (novelty) that are distinct from past works; and (2) creative abilities frequently coexist with exploratory activity. (3) In an area or community rich in art and culture (heterogeneous and unique), creativity and exploration will lead to the invention; and (4) in the context of creativity and batik exploration: designing the motifs and coloring pertain to the natural environment, local culture, and local wisdom. Form (formal), content (symbol), and emotional expression contribute to this aesthetic, emotional connection. According to Graburn (1977), there are two categories of art based on the theory of art development: (1) art by destination, namely art by purpose, where a group of people produces works of art for their own needs; and (2) art by metamorphosis, namely art through metamorphosis, where people produce works of art for the needs of others.

CONCLUSION

Research results that can be targeted in this first year research program have been achieved including; (1) The creation of design innovations through optimization of the UP-CYCLE product redesign program. Fashion bags processed by mindi wood waste can be carried out effectively to encourage increased value for both MSMEs and their products. Carrying out a synergy program between the creative team, experts, researchers, field assistant team for fine arts students, and the production team in brainstorming creative ideas, designing and executing designs in the form of prototypes. The resulting prototype is then analyzed from the design aspect through the form follow

function and aesthetic follow function perspectives. (2) Implementation of the redesign results on the products produced as a strategic plan for the RIIM BRIN research program to help build access to improving the quality of human resources, good governance, marketing and tax reporting systems. This section will be followed up on research activities the following year. Considering that aspects of HR management, marketing and tax reporting are very important to obtain reinforcement. (3) Have innovative redesign results that obtain inherent legal protection for intellectual property rights (IPR) for innovative products that are produced prior to being marketed on the global market. The acquisition of IPR is strongly influenced by the productivity of the redesign results (both prototypes and products ready for market) to obtain legal protection for intellectual property rights. (4) Achievement of Technology Readiness Level (TKT) when the proposal was submitted in 2021 at the TKT 6 (six) position and during the implementation of research and assistance for the first fiscal year (2022-2023) has achieved TKT year 1 (TKT 7), which is planned to be followed up on the 2nd year follow-up research program (with the hope that the results will reach TKT 8), and in the 2nd year follow-up research program (with the hope that the achievements will reach Year 3 (TKT 9)).

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