

Section: Management and Economics

The Impact of Technology on the Innovation of Aluminium Products in Sawan District Buleleng Bali Indonesia

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Abstract:

Bali as a tourism area has craft centers scattered in various districts. One of the handicrafts that is the flagship product in Bali is aluminum craft based in Menyali Village, Sawan District, Buleleng Regency. Mr. Gex Aluminum and Candra Art are two groups of craftsmen who produce aluminum on a home industry basis. The existence of this business must get attention and support for the success of the people's economic program in order to improve the economy, the entrepreneurial spirit of the youth and to reduce the level of urbanization. The workforce used by this group is mostly students to fill their spare time (parttime) and vacation. Despite having a high number of requests, these two business groups have not been able to produce optimally because the equipment used is still in limited space and the product processing process is still manual. In addition, the layout of the production process has not been arranged, accounting bookkeeping system has not been done regularly and regularly, the owner has not made payments and tax reporting, product marketing is still limited, the product does not have a name or logo. The main impact of all these problems is that the production process cannot be carried out effectively and efficiently, because products that are in accordance with standards cannot be maximally produced.

Based on the priority of the existing problems, the solution that can be offered through this program is to apply technology with the help of grinding, welding, cutting of NRT and concrete iron cutting tools for efficiency and creating molds to produce product innovations, rearranging production space and equipment, designing Standard Operating Procedures (SOPs), training in preparing financial reports, mentoring tax reporting, designing business card designs, websites and catalogs and designing product logos produced. With the implementation of this service program the expected output target is an increase in production according to the standard of 100%, lay out according to the production process, has two types of SOPs, is able to prepare financial statements, able to report tax on a self-assessment basis, has a business card, product catalog, and website and the product produced contains the business logo. In essence this service is expected to be able to improve the economy of the community and support the government's efforts to succeed in the people's economy program.

Keywords: productivity, populist economy, aluminum crafts, technology

I. Introduction:

1.1 Situation Analysis

Bali as a tourism area has craft centers scattered in various districts (Yuesti, Julianti, Suryandari, and Astuti, 2018). Therefore, assistance is needed for development (Yuesti and Sumantra, 2017). One of the handicrafts that is the flagship product in Bali is aluminum craft based in Menyali Village, Sawan District, Buleleng Regency. The majority of the residents of Menyali Village are craftsmen of aluminum crafts that are still traditional in nature, which are made by hand (hand made). The community groups are included in one group, namely Sumber Urip, which has about 45 members. Even so, each family keeps making their own crafts so that they can provide new jobs for the people in the village. The results of handicrafts are marketed not only for domestic market needs such as ceremonial facilities or household appliances, but have penetrated international markets through souvenir products (souvenirs) and complementary hotel interior design. Considering the making of this craft is based on home industry, the existence of this business must receive attention and support to support the people's economic program in order to improve the economy of the community. Aluminum Pakgex and Candra Art are business groups that still consistently produce aluminum crafts. In connection with the craft manufacturing process of the two business groups, it can be explained the existing conditions of the two business groups:

1. Craft materials from aluminum sheets combined with zinc, silver, glass, following certain patterns made manually. There are various size variations for each type of product that is customized according to order.
2. Over the past three years, product sales have increased. In 2009-2012, sales of these products had experienced a sluggishness due to the high level of competition in producing handicrafts. This is because most of the villagers of Menyali depend on this aluminum craft
3. The selling price for the product is largely determined by the shape, size, thickness of the material, and the level of difficulty in making the product. During this time, the products most in demand in the domestic market are *keben*, *bokor*, *saab* (closed bokor), and a place of incense because these products are often used as a means of ceremonial ceremonies in Bali.
4. The workforce employed in Pakgex Aluminum is 6 people who are paid 30-40 thousand rupiah / day, while Candra Art is 4 people. Workers come from young people in the neighborhood. There are also students who spend their spare time part time for Rp. 3,500 / hour. A worker can complete \pm 15-25 products / day for difficult products (through 3 processes), and \pm 50-60 products / day for relatively simple products.
5. Product quality and quality depends on the condition of the equipment used, raw materials and workforce skills (Antara, 2006). Production equipment owned by business groups such as 1 large cut scissors, 2 pieces of small scissors, 4 pieces of large forceps, 3 pieces of small forceps, 2 pieces of steel hammer, 2 pieces of big hammer, 4 pieces of hammer, 2 pieces of hammer, and nails and iron carved 10 pieces. The production capacity of both business groups is still low because the process still uses simple tools and is done manually so that the products produced for certain orders do not meet the standards.

6. The layout (lay out) of the production process has not been arranged with a good flow, so this also causes the production and work processes that are slow and very inefficient (Heizer and Render, 2006). It seems that to get immediate improvement is the workplace or production room so that workers feel comfortable.
7. Management and management of the business of the two partners is still done traditionally. According to Sailendra (2015), one of the weaknesses of the production process is the absence of a Standard Operational Procedure (SOP) at each stage of production. Quality control that is not carried out from the beginning of the production process does not go well will reduce the quality of the finished product.
8. So far the products made have not been quality controlled so that some of the products produced are still not in accordance with the quality standards produced.
9. The financial management recording system has not been carried out regularly and regularly. The production process from the purchase of raw materials to the delivery of ordered products is all done without clear recording. Business bookkeeping such as diary, cash book, balance sheet, raw material stock, finished product stock, profit and loss calculation are not well available. Both business groups belonging to MSMEs must improve their bookkeeping so that business management becomes better (IAI, 2010).
10. So far both business groups have never reported tax on business turnover obtained. This is because the owner does not know the information about the procedures and provisions for calculating and reporting business tax.
11. Sales and marketing of products mostly through artshop in Ubud and Sukawati area, and has penetrated supermarket Hardy's as the largest supermarket in Bali. Not only in Bali and Indonesia, this craft has even been marketed to England and Australia. Most products are sold to collectors so there are differences in production prices and selling prices that are far enough on the market. In the low season, marketing is also carried out directly to traditional markets, where the owner will sell goods directly to the trader.
12. So far the products produced do not have a brand either in the form of a business name or logo so that they do not have the characteristics of the product produced.

In the business of handicrafts, bokor made from aluminum is very prospective. This is proven, marketing is not only at the local level, but also leads to domestic and foreign markets. Both of these business groups have quite good potential which is characterized by an increase in orders in local and national markets. Even so, craftsmen are always required to always be able to create products with high creativity and innovation. The products of both business groups will be able to win and demand at a high level of competition, if their products have characteristics and are difficult to follow by their competitors. The problems faced in the development of crafts vary greatly from human resources and crafters' competencies in the form of technology to produce creative and innovative products, product marketing, and capital. Considering the existence and existence of this business group is very important for the community and the complexity of the various obstacles faced, then this underlies the proposer team to hold the two business groups as partners in this PKM program. From the observations of the team that has been done, it appears that the two business groups, for the sake of the sustainability of their business, are very feasible to get guidance and assistance from the government in this case DIKTI through continuous Higher Education.

1.2 Partner Problem:

After discussions with the owners of the two business groups, the priority activities to be carried out are as follows:

1. Production capacity is still low: This is because the equipment used is still in limited housing and the product processing process is still manual (Priatman, 2004).

Table 1.2 Comparison of Use of Manual and Modern Tools

Description	Type of Grill / Oven	
	Manual	Modern
Pacalan/ukiran	160 unit/day	200 unit/day
Pelitan/alisan	20 unit/hour	200 unit/hour
Pembulatan kawat	100 unit/day	1.000 unit /day
Pemotongan kaca	20 unit/day	100 unit/day

Based on the results of observations and interviews with the owner, the tools needed for grinding equipment, welding transformers, drill sits large, vise, cutting iron, rolling iron, which is used to make the edges (pelitan / groove), then the edges are trimmed with a steel hammer. In addition, press tools are needed to help make carvings on aluminum. The use of the right tools will increase the quantity and quality of the product. The use of modern tools can also save production time and increase company turnover. With this equipment molds were also created to produce creative products in the form of hanging lamps and table lamps from aluminum. Mold lighting products created by the creation of Pak Gex aluminum owners can produce innovative products that have value (have value) (Rumanti and Hadisurya, 2004). These products are difficult for competitors to follow because the molds are created from their own creations which are derived from consumers' experiences and tastes. Most SMEs have not made technological innovations (Sumarno, 2010), and only use traditional technology (Wahid and Iaswari, 2007).

2. The layout (lay out) of the production process is not well organized: Workplace design is also an important factor in the production process that is carried out manually so that the workforce can work safely and comfortably (Suharti, Sugiono, and Purwati, 2013).

3. Do not have a Standard Operational Procedure (SOP): This problem needs to be addressed immediately because every business needs to have an SOP. The SOP provides information to do a job correctly for each workforce, and makes it easy to evaluate the application of inconsistencies in the quality and quantity of a product or end result (Rumanti and Hadisurya, 2017).

4. Accounting bookkeeping systems have not been carried out regularly and regularly: This problem needs to be addressed immediately because with a good bookkeeping system, the owner can find out the cash flow, the calculation of the cost of production, and the costs incurred. Through a good computerized accounting system, the level of efficiency and effectiveness of the business will be known.

5. **The owner has not made tax payments and reporting:** This problem is a priority so owners can make payments correctly and independently according to business turnover and applicable tax provisions.
6. Product marketing is still limited to existing customers so that a wider export market needs to be pursued by participating in exhibitions, business card making, product catalogs and website creation
7. **Don't have a business name / logo:** This problem is a priority to distinguish products produced with other similar products on the market. Aside from being a distinguishing sign, the name / logo also aims to protect Balinese carvings on the products produced.

1.3. Solution offered

Based on the problems faced by the two business groups, the solutions offered to support the realization of the PKM program are:

1. Providing assistance in production equipment, namely grinding, welding, cutting of NRT, tools, grinding, welding transformer, drill sitting large, vise, cutting iron, rolling iron, which is used to make the edges (pelitan / groove), then the edges are trimmed with a steel hammer. The production equipment will also be used to make 3 types of molds to make hanging lamps and table lamps. In addition it is modified into a press to help make engravings on aluminum.
2. Arrange the space for layout and production layout.
3. Designing SOPs to maintain product quality consistency.
4. Provide a computerized accounting system and training in the preparation of accounting accounting systems, namely the production price report, income statement and balance sheet.
5. Provide system consultation and tax calculation procedures and reporting.
6. Designing business cards, catalogs, website with attractive and communicative designs, for the development of product marketing.
7. Design a business name or logo that will be included in the craft product.

II. Implementation Method:

2.1 Science and Technology Application Method:

Based on the problems and solutions offered, the method of application Science and technology implemented to support the realization of the PKM program is:

2.1.1 Production Aspect:

1. Providing assistance with grinding tools, welding transformers, cut of NRT, tools, welding transformer, large sitting drill, vise, iron cutting, rolling iron used to make the edges (pelitan / groove) and smooth the edges of the products produced and to create creative new product moldings in the form of sitting lights and hanging lamps. These tools are also modified to make press tools that form carvings on aluminum sheets.

2. Arranging the layout (layout) of production and storage places in accordance with the order of the production process and the feasibility of the production space. This activity is supported by providing shelves to organize production.

2.1.2 Management and Bookkeeping Systems Aspects:

1. Design and prepare SOPs for the production process and quality control of the two aluminum craftsmen.
2. Provide a computerized accounting system and training in the preparation of simple financial statements consisting of Reports on Cost of Production, Income Statement and Balance Sheet.
3. Providing consultation on the system for calculating tax reporting as well as mentoring for tax reporting based on self.

2.1.2 Marketing Aspect:

1. Designing product catalogs, business business cards, website creation with attractive and communicative designs, and marketing development to Balinese souvenir markets.
2. Designing a business name or logo that will be included in the craft product.

2.2 Stages for Implementing Solutions:

The service activities approach is of course highly related to the objectives to be achieved, this Community Activity Program is to improve the welfare of the community and improve the entrepreneurial spirit among young people. The Approach Method used so that the Community Partnership Program is able to solve the problems that occur in partners are:

- a. Providing equipment assistance and mentoring the use of equipment to support increased quantity and quality of production

Providing assistance in cutting discs, grinders, welding transformers, large sitting drills and mentoring together with the team for their use is expected to be able to improve the products produced both in terms of quality and in terms of quantity. Plate cutting, grinding, welding transformers, large sitting drills are used to make edges (pelitan / brow), then the edges are trimmed with a steel hammer. The use of this tool can save production time and is expected to increase company turnover.

- b. Arrangement of lay out in the production process.

This approach begins with providing an understanding related to the importance of structuring lay out in the production process, to create security and work comfort. This activity can also reduce the number of work accidents that occur during the production process.

- c. Design and preparation of SOPs by discussing the results of the design with each company. The SOP design objective is the consistency of the quality of the products produced.
- d. Conduct training related to computerized accounting systems and training in the preparation of simple financial statements consisting of Reports on Cost of Production, Income Statement and Balance Sheet.

Companies that have a good bookkeeping system, the owner can find out the cash flow, the calculation of cost of goods manufactured, and the costs incurred. Through a good computerized accounting system will be known the level of efficiency and effectiveness of the business immediately if needed at any time. After providing training, so that it can be applied, assistance is made regarding the application of a simple accounting system.

e. Provide understanding with the consultation system related to the system for calculating tax reporting. Together with the team, they provided an understanding of the tax payment process on a self-assessment basis. This activity is of course aimed at making the two companies independent in the process of paying taxes.

f. Design a product catalog, business name card, website creation.

Together with the team and company owners, designing product catalogs and business cards for website creation. This activity was preceded by forming the company's product logo. This aims to characterize the products produced by the two groups of craftsmen, so that consumers can easily recognize them.

This empowerment activity is carried out in stages with methods: discussion and brainstorming, training and mentoring, and evaluation of activities

1. Discussion and brainstorming: This empowerment activity begins with a discussion and brainstorming between the service implementation team and the two partners. This is done to determine priority issues that must immediately be addressed.

2. Training and Assistance: Training and mentoring is carried out in accordance with the expertise and competence of the service implementation team. SOP design assistance, standardizing product quality control and designing catalogs, business cards and websites will be carried out by Anak Agung Dwi Widyani SE., MM from the Faculty of Economics. Team member I Nyoman Kusuma Adnyana Mahaputra, SE, MM who has expertise in the field of financial management and taxation, will provide training and assistance related to the preparation of simple financial statements and the process for self-assessment of taxes. Assistance related to the use of disc cutting tools, grinders, welding transformers, large sitting drills, arranging the layout and production space and designing the business name or logo is done by team members from the Faculty of Engineering, Ir. Ketut Sri Astaty Sukawati, MT.

3. Evaluation of activities: After the activity has been carried out, an evaluation phase will be carried out to find out how far the percentage of the achievement of the planning related to the problems and solutions offered. This evaluation was carried out with a quantitative approach to facilitate interpretation of the success of the activity.

2.3 Partner Participation:

In order to realize the solution offered, the form of partner participation in the implementation of this program is as follows:

- 1) Partners are willing to participate in the form of funds to support the smoothness of the program, if the price of equipment and materials needed to create creative lighting products and press tools exceeds the service budget plan.
- 2) The Partner will confirm the production plan and time prepared to rearrange the production space as well as the placement of display shelves for production, so the program proponent team can carry out activities without interrupting the course of the production process.

3) Partners are willing to follow all activities proposed in this research program.

III. Results and Extensions Achieved:

There are several programs that have been implemented by the Mahasaraswati University Community Partnership Program team in Denpasar. The programs implemented are based on problems that occur in aluminum UMKM in Menyali village, namely Mr. Gex and Candra Art.

3.1 An Overview of Aluminum Crafts:

Menyali is one of the villages located in Singaraja district. Most of the livelihoods of people from generation to generation in the village are as aluminum craftsmen. However, most of the people leave the business because the level of competition and the limitations of the innovation they have are unable to keep up with the times. In addition they have no creations in following consumer tastes. Aluminum handicrafts can be made into products of various shapes. The products that can be produced from aluminum can be used as supporting facilities for the ceremony, as a complement to the room decoration and beautiful ornaments. In order to maintain the sustainability of the business (sustainability), it requires the creation and innovative capabilities of the owner to always develop the creativity of the product.

The business of Mr. Gex and Candra Arts is an aluminum handicraft business in the village of Menyali. The manufacturing process Crafted raw materials from aluminum sheets combined with zinc, silver, glass, follow certain patterns made manually. Both partners produce products from Rp. 1,500 to Rp. 200,000 / pc.

The crafting process is carried out through the first process of aluminum sheet which will be cut first stacked several sheets to be cut according to a certain pattern. To form and coat the edges, a thick wire has been formed beforehand. Thick wire is formed with equipment that is designed by the owner himself, supported by equipment that is given assistance to partners in this empowerment.

The periphery of the product is coated with thick wire, if it is not formed beforehand using the device created by Mr. Gex, of course it will be difficult to form and requires a longer time. After a thick wire is formed, it is attached to the edge of the pattern that has been formed beforehand, then proceed to flatten or smooth the edges by using wipro and hammer taper pliers. Most of the products are done manually, so if it is not assisted with equipment designed from innovative capabilities, it will reduce the number of products produced.

3.2 Results and Outcomes achieved:

The results and outcomes achieved in the Community Partnership Program are as follows:

- 1) Materials and equipment provided in this program are press, grinding wheel, welding plate, welding wire, taper pliers, vise and cut iron concrete, which is very helpful for the process. Efficiency and effectiveness after the existence of this equipment increases by about 100% to 200%. Before some aluminum sheets are cut or patterned, more aluminum sheets can be cut or patterned beforehand. Through the press, the aluminum sheet that will be formed will be easier to cut in accordance with the desired or patterned shape. Before there was a press, an aluminum sheet that could be cut no more than 10 sheets at a time. While after the press, an average of 50 pieces of aluminum can be cut at once.
- 2) When viewed from the amount, the wire to coat manually shaped edges can be produced 100 per hour, but after using the tools provided to the partner, the resulting wire has a very significant increase of 26 to 800

s. 1000 wire forms per hour. After being assisted by the created tool, it can also produce neater product quality. The equipment can be shown in Figure 1 below:



Figure 1 Tools provided to Partners

The tools provided to partners, in addition to being able to improve the efficiency and effectiveness of the production process are also to create mold tools to produce creative products in accordance with the development of consumer tastes. The product produced is in the form of table lamps and hanging lamps from aluminum. When they tried to offer lighting products made with makeshift equipment, it turned out to get a good response from domestic and foreign consumers. This is indicated by an increase in orders for artshop owners in Kuta and in the Ubud and Tegalalang areas for these new products. The mold tools that are capable of being created are supported by the equipment provided in this PKM program, making the resulting product has the characteristics of a Pak Gex aluminum. The molded tool created can be shown in Figure 2.



Figure 2 Pak Gex aluminum new product creation

2. Structuring Layout of Production Processes and Production Results

The arrangement of lay out in the production process begins with providing an understanding related to the importance of structuring the lay out in the production process, to create security and work comfort. This activity is carried out also can reduce the number of work accidents that occur during the production process. This approach can reduce defective products $\pm 2\%$ of the total products produced, and improve production quality by 100%. The arrangement of the production output lay-out is also important for the attention of both partners, especially consumers often place orders directly to the production site (workshop).



Figure 3 Pak Gex aluminum new product creation

3. Design and Preparation of SOPs:

Management and bookkeeping aspects are carried out in the design and preparation of SOPs by discussing the results of the design with each company. The SOP design objective is the consistency of the quality of the products produced.

4. Training and Assistance of Computerized Accounting Systems:

Provide accounting programs for stock and sales in small businesses, followed by stages of training and mentoring related to the use of the program. Through the programs and training provided to partners related to the computerized accounting system, it is expected that the partners will be able to implement the preparation of a simple financial report consisting of Reports on Cost of Production, Income Statement and Balance Sheet. Companies that have a good bookkeeping system, the owner can find out the cash flow, the calculation of cost of goods manufactured, and the costs incurred. Through a good computerized accounting system will be known the level of efficiency and effectiveness of the business immediately if needed at any time (Rustiarini and Widyani (2015); Widyani et.al (2015)



Figure 4 Training on the use of simple accounting system programs

5. Assistance for Tax Reporting Based on Self Assessment.

Providing understanding with the consultation system related to the system for calculating tax reporting, followed by assistance for the tax payment process. Together with the team, they provided an understanding of the tax payment process on a self-assessment basis. This activity is of course aimed at making the two companies independent in the process of paying taxes and punctuality of 100% in the payment and reporting of taxes both monthly and yearly.



Figure 5 Assistance with tax reporting procedures

6. Making and mentoring the use of the website and product catalog:

The use of websites for small and medium businesses as well as for SME business people is indeed not the only way to improve and increase product sales. The use of the website can be used as a strategy to expand the market, expand networks and efficiency. Through the website, marketing of the two partners' products can be done more widely. The use of websites for SMEs can also cut operating costs, because these SMEs do not need large offices and shops. Efficiency in terms of time can also be created through the website, because transactions can be done more quickly and accurately.

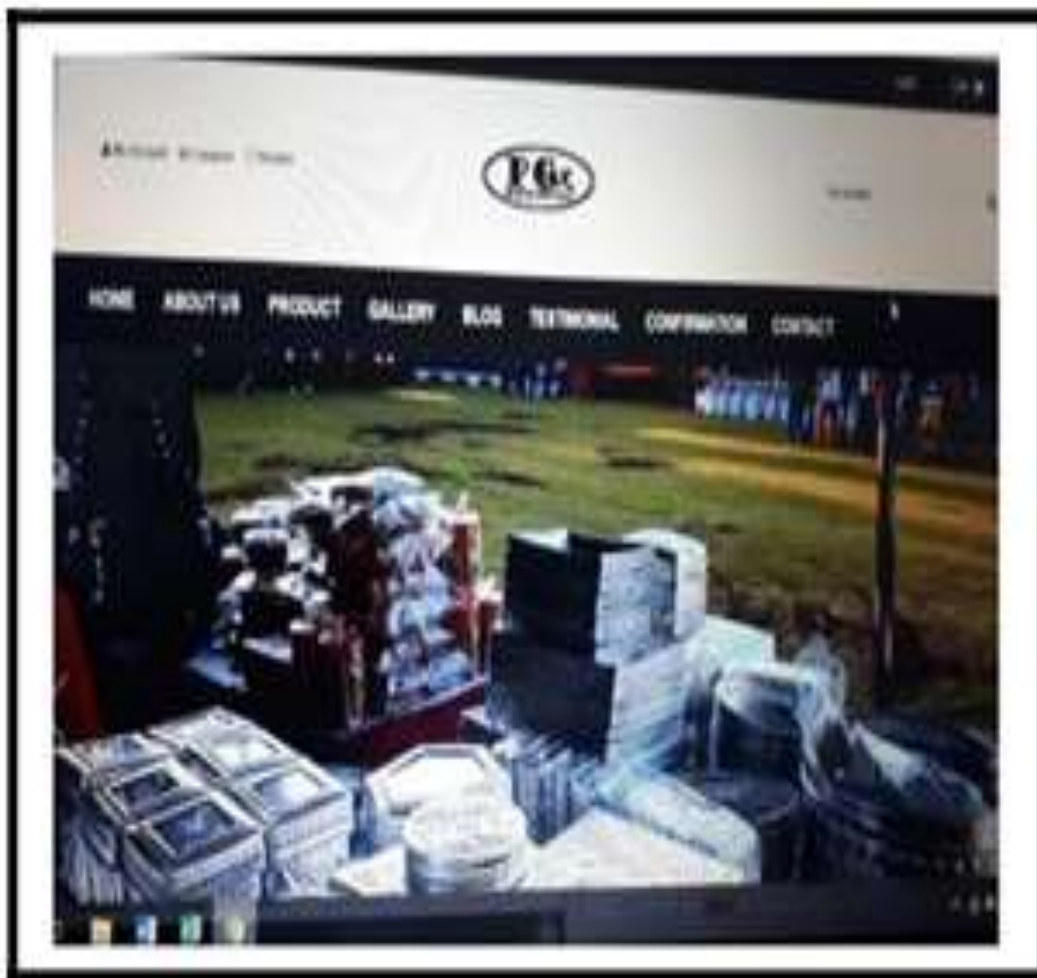


Figure 6 Display of partner websites

7. Making Business Cards and Business Logos

Together with the team and the owner of the company, design business cards and business logos. Business card making is done because it is a means to inform the place of business to the public. In addition, through the business card, the community will recognize the products of the two partners. This activity was also carried out to form the respective business product logos. This aims to characterize the products produced by the two groups of craftsmen, so that it is easily recognized by consumers. Through making business cards and creating business logos, it is expected that sales will increase by $\pm 50\%$ for each month.



Figure 7 Partner Name Card

The next stage of planning related to activities that have just been carried out around 70.671% are as follows:

1. Continuing to design a Business Card for partner 2 (Candra Art).
2. Monitor the process of completing the logos of the two partners (Mr. Gex and Candra Art).
3. Publish partnership programs carried out on print or electronic media.
4. Following scientific publications or proceedings with ISBNs at national seminars.
5. Assistance related to the design of advanced SOPs for Mr. Gex and Candra Art Aluminum, so that the two partners can consistently improve the quality and quantity of products produced.
6. Providing assistance and monitoring related to the accounting program provided to two partners, so as to create consistency in making simple financial statements and knowing the number of stock products owned at any time

Based on the budget and activities carried out, the details are as follows:

Activity budget (100%)	Rp. 41,000,000
Activities that have been carried out (70.671%)	<u>Rp. 28,975,000</u>
Activities to be carried out (29,329%)	Rp. 12,025,000

VI. Conclution and Suggestion:

6.1 Conclution:

Based on the problems that occur from the analysis of the situation carried out, the Community Partnership Program activities consist of aspects of production, management aspects and bookkeeping systems as well as marketing aspects.

- 1) Production aspects are carried out by providing equipment assistance in the form of presses, sitting grinders, welding pipes, welding wires, taper pliers, vise and cut iron concrete and structuring the production site and the products produced.
- 2) Management aspects and bookkeeping system are carried out by several activities, namely:
 - a. Designing and mentoring Standard Operating Procedures,
 - b. Providing accounting systems and mentoring the use of a simple accounting system for MSMEs
 - c. Providing understanding of tax payments on a self-assessment basis.
 - d. Designing website creation and cataloging and assisting its use
 - e. Designing business cards and business logos on products that are a method of implementing activities from the marketing aspect.

6.2 Suggestion:

The methods implemented in this PKM activity are essentially to solve the problems that occur in both partners to improve the economy of the community and support the government's efforts to succeed in the people's economic program. The magnitude of the benefits of the activities carried out in this community partnership program, should be consistently implemented by the two partners. Besides that, Pak Gex aluminum and Candra Art aluminum consistently improve their innovative capabilities so that they can maintain the sustainability of the products they produce and enhance their competitive advantage capabilities, in the midst of increasing business competition.

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