



# Custom Acrylic Souvenirs Using Laser Cutting Technology as a Product of Program Kreativitas Mahasiswa Kewirausahaan (PKM-K)

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**Abstract.** A souvenir is an award or gift that given to a person for the achievements he has achieved which will be used as a memento to remember the moment. Souvenirs are one of the choices and must innovate with technological advances. This study aims to analyse aspects of production, marketing, and business management, as well as the potential for innovation development of the Custom Acrylic Souvenir business with Laser Cutting Technology carried out in the implementation of the Entrepreneurship Student Creativity Program (PKM-K) in 2022. This product is expected to be the latest innovation for consumers who have high satisfaction and can optimize the fulfilment of needs in providing appreciation and memorable memories to others. The implementation methods carried out in this activity are the preparation of tools and materials, production, marketing, reporting and evaluation, as well as business development. The results of the PKM-K Custom Acrylic Souvenir activities with Laser Cutting Technology are: 5 products with 3 variations, product copyright, with a turnover of Rp 9.745,000 from the sales of 231 products.

**Keywords:** Souvenirs · Acrylic · Entrepreneurship · Customer

## 1 Introduction

Small and Medium Enterprise (SME) is one of Indonesia's economy cogs. Based on data from the Ministry of Cooperatives (SME), the number of SME currently reaches 64.2 million, and in 2020 has contributed to the Gross Domestic Product (GDP) of 60.51% or IDR 9,580 trillion with the ability to absorb 96.92% of the workforce, and can collect up to 60.42% of the total investment [1]. With the great advance in SME, the entrepreneurs are required to ready and could adopt the use of technology especially at the industrial revolution 4.0 now.

In the industrial revolution 4.0 feel that technology is developing so fast, where human connectivity, data and machinery in the form of virtual connected with digital and technological advances, and causing change in various walks of life. Industrial era

can change society into coexist with technology, which means current technology played an important role in life, so that you do not want to all levels of life would have to adapt to technological progress if not left behind [2]. With the technological advances, demand from customers will also be developed and entrepreneurs must adjust to technology and must compete with others. Nitisusastro explained that someone who has decided to become a business actor even on a small scale can be called an entrepreneur [3]. As a business operators or entrepreneurs, he need to develop entrepreneurship. Students will plunge into the world, entrepreneurs are required to have the science technology and able to be creative and innovative.

With the Program Kreativitas Mahasiswa-Kewirausahaan (PKM-K) it can certainly increase the creativity and skills possessed by students and foster an entrepreneurial spirit [4]. With joining in the workshop is expected to be a new job opportunities that can produce a promising business, one of them is the souvenir business.

Souvenir defined as a gift that usually given as a memento or as a reminder of an event. As time passes, the need and desire for these souvenirs also develops, where customers also want new innovations for the souvenirs. Hence, "Toke Pempek 3D" team innovated acrylic souvenirs custom using laser cutting technology. The laser cutting method is a modern process in machining that can be used in cutting with a unique pattern, with a relatively fast time [5]. The development of new methods towards technology provides convenience in the production process with a high level of graphic accuracy so as to minimize errors in printing.

The principle of laser technology cutting direct high-power laser beam to material that is to be cut through the computer. The results obtained from this technology is accurate enough, because it has an accuracy level of 0.001 mm. Production is also faster, more efficient, without the need to expend a lot of energy, so that it can support mass production which at the present time the demand for souvenirs is also increasing, especially in terms of awarding gifts in the form of souvenirs at events among the public.. With the existence of laser cutting technology and the materials used are acrylic, it will make souvenirs look more beautiful, attractive, can be more durable, will not be damaged if exposed to water, and is resistant to corrosion.

The purpose of the Program Kreativitas Mahasiswa Kewirausahaan (PKM-K) for the implementing team is to develop student skills in entrepreneurship. For the community, the benefits are providing satisfaction with the demand for souvenir products with good quality, affordable prices, and aesthetics, and the manufacturing process is fast, and can create new jobs for the community, both in terms of production and graphic design services.

## 2 Methodology

The implementation method used in this activity is the preparation of tools and materials, production, marketing, evaluation, reporting, and business development. This study aims to analyze aspects of production, marketing, and business management, as well as the potential for developing business innovations for Custom Acrylic Souvenirs with Laser Cutting Technology which are carried out in the implementation of the Program Kreativitas Mahasiswa Kewirausahaan (PKM-K) in 2022. The data obtained is the result

of activities PKM conducted by State Polytechnic of Sriwijaya students. The methods for implementing PKM-K Custom Acrylic Souvenirs with Laser Cutting Technology are:

## 2.1 Steps

### Preparation

The first activity is a survey of tools and materials. It was to find out which materials were good for consumers to use because comfort in an activity is an absolute necessity that is highly sought after and optimized by every manufacturer. The survey activity was carried out by visiting several material shops in the city of Palembang, as a reference for the materials to be used. The main material used is acrylic that has many size according what customers want. Then the tools used are laser cutting machines to print products and laptop/computer to make a design (Fig. 1).

Product packaging uses placard boxes, plastic packaging, metal key chains, and some sticker knick-knacks to beautify the packaging. Where these items are purchased through online shops and in several shops in the city of Palembang (Fig. 2).

### Production

The production stage start with creating a product design. Designs are made using a variety of applications such as Inventor, Autocad, Adobe Illustrator and so on which can be exported to dxf format. Then we imported the dxf file into the laser application to set the cutting speed, power, and set which parts will be cut and which parts will be engraved. Then, we imported the design into the laser cutting machine by USB cable (Fig. 3).



Fig. 1. The survey tools and material and control of machines



Fig. 2. Tools and materials

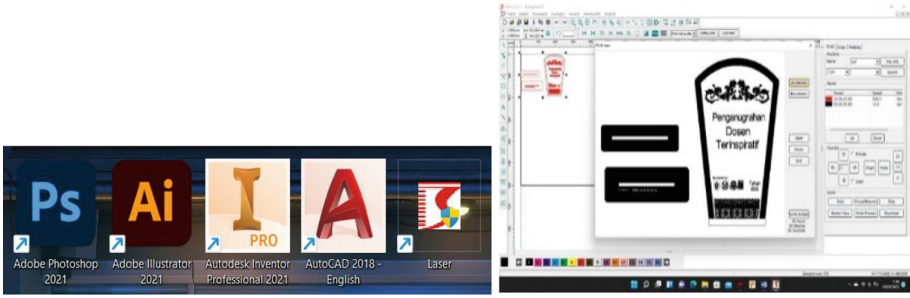


Fig. 3. The applications and product design



Fig. 4. Product printing



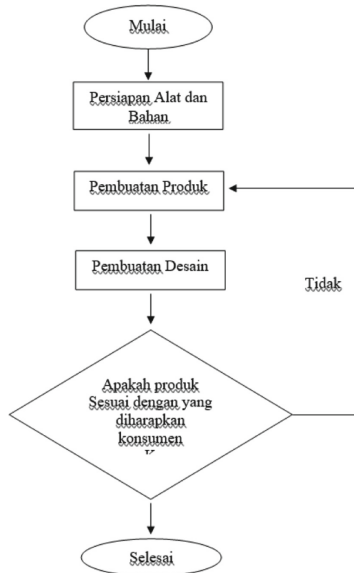
Fig. 5. The result

After the design imported into the laser cutting machine, then adjust the laser position and print it (Fig. 4).

After the product has been printed, the product was cleaned by a cloth and a brush, and then packed (Fig. 5).

In general, the production stages of a Custom Acrylic Souvenir with Laser Cutting Technology are described in the flowchart as shown in Fig. 6.

Initially, the custom acrylic souvenir product design only had variations by only making products according to customer wishes. But to make the products produced more



**Fig. 6.** Production stage flowchart



**Fig. 7.** The products of custom Acrylic souvenir

varied, the Toke Pempek 3D team makes their own products which are the hallmarks of the business itself (Fig. 7).

**Marketing**

Product marketing is carried out by distributing pamphlets regarding the products offered to the environment inside and outside the Sriwijaya State Polytechnic campus, as well as through social media such as Instagram, Facebook and Whatsapp. Marketing was also

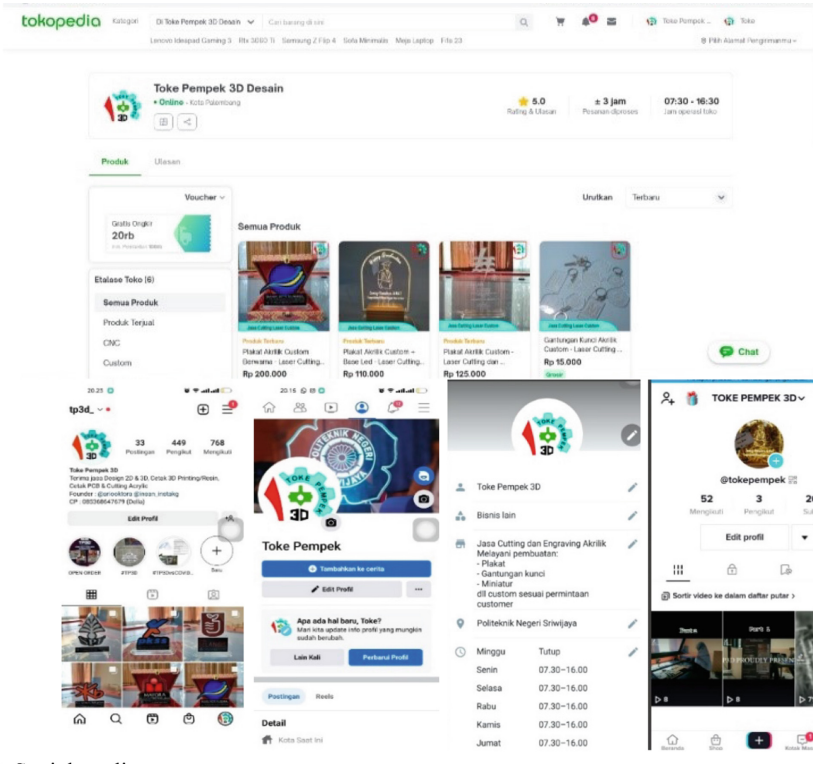


Fig. 8. Social media

carried out by placing banners and brochures for promotion and posting them on the campus bulletin, to be precise in the BEM KM Polri bulletin and also the Mechanical Engineering Department building bulletin.

The creation of social media accounts and online shops was also carried out to provide information and provide access for consumers to buy products. The accounts created include Instagram, Facebook, WhatsApp and Tokopedia. In increasing sales of acrylic souvenir products, marketing was also made through Tiktok media. This is done as a strategy in attracted the interest of the consumers to purchase products bearing numerous tiktok users from different regions throughout Indonesia (Fig. 8).

### Evaluation

The evaluation is done by asking testimony to consumers who have purchased souvenir products as well as to see the success and sustainable business opportunities as well as facing risk averse. This testimony is used to see progress being executed activities and whatever decision and action to be taken after this date. Not only that, the success of a business are also evaluation carried out using media promotion in social media through insight review the social media.

Some of the evaluations that have been carried out are product design improvements, efficient use of funds, production processes, marketing effectiveness, product sales, and

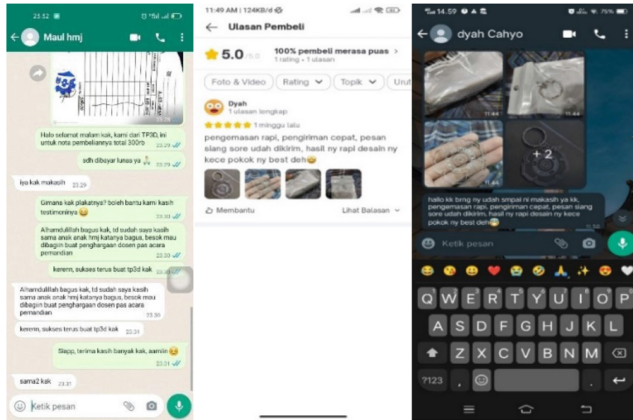


Fig. 9. Testimony

business sustainability analysis. Students interview consumers on products that have been sold whether they are satisfactory for consumers or not through the testimonials as shown in Fig. 9.

Evaluation based on customer satisfaction, amount of sales, the quality of the product and the effectiveness of the implementation of the program. The evaluation was can make maximum activities and to minimize of risk of faced by

## Report

Any activity conducted at out of the PKM-K can reported directly by students through simbelmawa website. Such as production, promotion, marketing, sales and evaluation activities are recorded using a logbook. Students had to provide a report on documentation and cash as evidence valid of the implementation of the work being done.

## 2.2 The Development and the Sustainability of Business

The business development carried out is to produce a superior product which is the hallmark of this Souvenir business, namely “Ampera Bridge 3D Puzzle”. This product innovation was inspired by the Palembang city icon which can be used as learning media for students for study purposes. The production of “Ampera Bridge 3D Puzzle” was carried out because it has quite a large opportunity in the market and can make the business sustainable in the future. The implementation method in this business can be explained in Table 1.

## 2.3 Development of New Method

The activities carried out are the application of technology in entrepreneurial activities which were previously carried out manually or handmade. But now those activities carried out by combining previous methods and technology. The laser cutting method is

**Table 1.** Business activity

No	Event	Month				Place
		1	2	3	4	
1	Tools and materials preparation	•				Laboratory of CNC in Mechanical Engineering departmenet, Sriwijaya State Polytechnic
2	Production	•				
3	Marketing	•	•			
4	Evaluation		•	•		
5	Report			•	•	
6	Business development				•	

a modern process in machining that can be used in cutting with a unique pattern, with a relatively fast time [6]. The development of new methods towards technology provides convenience in the production process with a high level of graphic accuracy so as to minimize errors in printing.

**2.4 The Use of Existing Methods**

The activities carried out also use existing methods, namely the application of color to acrylic which is still done manually and the merging of product parts is still done manually. This activity is carried out in the completion of the production stage of acrylic souvenir products.

**3 Result and Discussion**

**3.1 Business Commodities**

The types of products offered are acrylic souvenirs in the form of placard, calendar, key chain and other custom products. This souvenir was quite different from others, where this product was made from acrylic and made by used laser cutting technology. This was made this product superior, so that it supports mass production. By using this technology, the manufacturing process becomes faster, does’nt require a lot of energy, and has high accuracy. Customers can also order custom designs according to what they want.

**3.2 Business Economic Analysis**

During promotional activities and production, 139 key chains, 42 plaques, 35 name tags, 2 custom whiteboards were sold, and received laser cutting and re-drawing services. Revenue/turnover obtained from the sale of these products and services, which is IDR



**Table 2.** Income analysis

Products	Price (Rp)	Sold Products	Omzet (Rp)	BPP (Rp)	Profit (Rp)
Keychain	15.000	139	2.085.000	999.132	1.085.868
Placard	150.000	42	6.300.000	4.145.400	2.154.600
Nametag	15.000	48	720.000	481.000	239.000
Custom whiteboard	175.000	2	350.000	200.000	150.000
Laser cutting service	290.000	1	290.000	191.300	98.700
<b>Sum</b>			<b>9.745.000</b>	<b>6.016.832</b>	<b>3.728.168</b>

9,745,000 for approximately 3 months. Overall, the benefits obtained by the “Custom Acrylic Souvenirs” business are:

### Income

See Table 2.

### Break Even Point (BEP)

Calculation of Break Even Point (BEP) break even point is done to find out the volume of several sales made to produce total revenue equal to total costs so that there is no profit or loss. The BEP calculation in this souvenir business is as follows:

- BEP of keychain = Fixed cost/ (Price – Variable cost)  
= Rp 978.000/ ( Rp 15.000 – Rp 7.188)  
= 125 pcs
- BEP of placard = Fixed cost/ (Price – Variable cost)  
= Rp 978.000/ ( Rp 150.000 – Rp 98.700)  
= 19 pcs

Based on the calculated Break Even Point (BEP), in order for this souvenir business to continue and be sustainable in the future, it is necessary to sell 125 pcs of key chain products and 19 pcs of placard products to reach a breakeven point or a condition of neither profit nor loss.

### Payback Period

Pay Back Period (PBP) is a period needed to be able to return back the funds that have been used in a business. The calculation of PBP in this business is as follows:

**Table 3.** Business economic analysis

Products	Fixed Cost (Rp)	Variabel Cost (Rp)	BPP (Rp)	BEP Unit	PBP
Keychain	978.000	7.188	999.132	125	2,0
Placard		98.700	4.145.400	19	1,5

- PBP of keychain = Income/ BPP  
= Rp 2.085.000/ Rp 999.132  
= 2,0
- PBP of placard = Income/ BPP  
= Rp 6.300.000/ Rp 4.145.400  
= 1,5

Based on the analysis of PBP, this business is appropriate to run because on the count of pay back period of the keychain is 2,3 and the placard is 1,5. Where if the ratio >1 then the business is feasible to run. In summary, the economic analysis of business is explained in Table 3.

**3.3 Business Development the Next Stage’s Plan**

The production of Custom Acrylic Souvenirs is carried out because it has a promising business opportunity, where the demand for these souvenirs will be in great demand and needed by people who have special moments. Initially, souvenir products were produced with custom products whose designs were wanted by consumers and there were several excellent products from souvenirs that were sold, including plaques, calendars, miniatures, and acrylic key chains. The production of this souvenir has the potential for the sustainability and development of this business in the future. The campus and supervisors also really support this activity by facilitating laboratories and laser cutting machines. Then there is an increase in market demand for products that can also compete with other similar products so that they can develop even more advanced.

To increase sales of this business product, Toke Pempek 3D team plans to create a new product called “Ampera Bridge 3D Puzzle” which is useful as a gift and can also be educational for consumers, especially for students (Fig. 10).

The “Ampera Bridge 3D Puzzle” product will be ready to be marketed throughout Indonesia considering that this product has many benefits, not only in terms of aesthetics but also as entertainment and education for the wearer. Hoped that this fruitful business development can be used for learning media and has added value for the souvenir business itself so that this business has considerable opportunities in the market and can create business continuity in the future (Fig. 11).

The packaging used in the “Ampera Bridge 3D Puzzle” product is designed to be as attractive as possible with pictures of the product itself and a historical explanation of the Ampera Bridge which is the icon of the city of Palembang. Coupled with paper bags

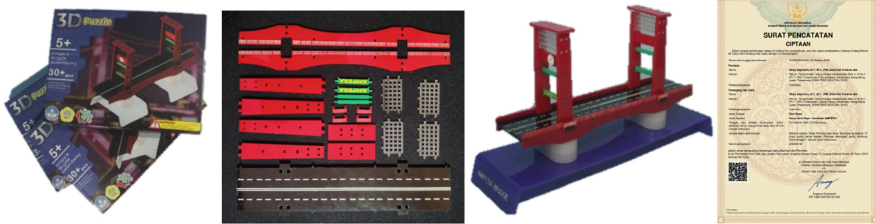


Fig. 10. Ampera 3D Puzzle



Fig. 11. The packaging of Ampera Bridge 3D Puzzle

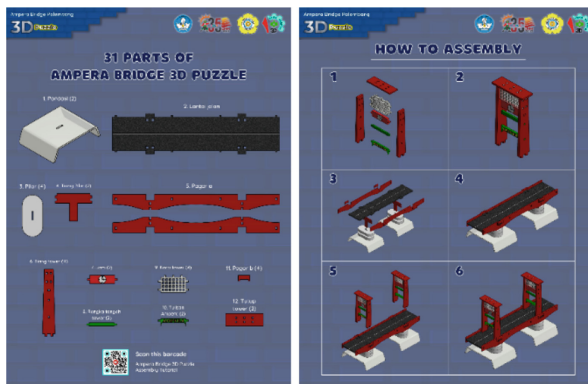


Fig. 12. Manual book of Ampera Bridge 3D Puzzle

which are the hallmark of a business identity and are made with strong and laminated materials so they don't get wet easily when exposed to water. Not only that, this product is also equipped with a manual book that will help explain how to make and assemble this 3D Puzzle to customers (Fig. 12).

To continue this business, the plan for the next stage is to market or promote products to all people in Indonesia. In addition to promotional media and online shop stores, the next marketing plan is to add promotional media platforms, such as linktree, whose function is not only to become a new promotion platform, but also to integrate existing promotional media, thereby hopefully increasing performance. Not only that, in the future 3D Puzzle products will feature icons from all provinces in Indonesia.

This business will create business opportunities that are managed by students and will continue to run even though they have graduated from college. In the future, this business will partner with fellow students majoring in mechanical engineering so that it will continue to create business continuity.

## 4 Conclusion

Based on an analysis of the realization aspect of PKM-K Custom Acrylic Souvenirs with Laser Cutting Technology activities, it has the potential to become an independent business entity with a broad target market, namely the general public, companies, students and college students, as well as schools and colleges. Not only that, this business also provides promising benefits, by producing quality, innovative and creative products. The implementation of this PKM-K activity has produced 5–10 products with details of 231 products which have been successfully sold to consumers with a turnover of IDR 9,745,000 which can be said to be a feasible business to run. This Acrylic Souvenir Business has a promising business opportunity if it continues to be developed. The offered solutions and careful product design give rise to a high quality product. Apart from being an innovative profit-oriented product, custom acrylic souvenirs with laser cutting technology are expected to be a solution for consumers, open up new business opportunities, and can create new jobs for the community.

## References

1. Kemenkop UKM, 2021. Peningkatan Potensi Ekonomi Digital untuk Mendukung UMKM. Jakarta, Kementerian Koordinator Bidang Perekonomian Republik Indonesia, p. 1.
2. Nagy, K. a. H. E., 2019. Building Pillars for Adapting Society 5.0 in Post Conflict Countries. IFAC-PaperOnline, pp. 40–45.
3. Lestari, N. D. and Toyib, M. (2017) 'Limbah Lingkungan sebagai Media Pembelajaran untuk Menumbuhkan Jiwa Kewirausahaan Mahasiswa Universitas PGRI Palembang', Faktor Jurnal Ilmiah Kependidikan, 4(3), pp. 227–240.
4. Direktorat Kemahasiswaan, 2022. Pedoman Kreativitas Mahasiswa (PKM) Tahun 2022. Jakarta: Ristekdikti.
5. Rakasita W., K. a. J. A. I., 2016. Optimasi Parameter Mesin Laser Cutting terhadap kekasaran dan Laju Pematangan pada SUS 316L Menggunakan Taguchi Grey Relational Analysis Method., Jurnal Teknik Industri, Vol. XI (No. 2), pp. 97–106.

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