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Padang, November 9-11, 2017

# PROCEEDINGS

## 4<sup>th</sup> International Conference on Technical and Vocational Education and Training (TVET)

**Theme :**  
Technical and Vocational Education and  
Training for Sustainable Societies



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## FOREWORDS

This proceeding aims to disseminate valuable ideas and issues based on research or literature review in the field of vocational, technical and engineering studies, which have been presented in 4<sup>th</sup> International Conference on Technical and Vocation Education and Training. This conference has taken place in Hospitality Center Universitas Negeri Padang, November 9-11, 2017.

The theme of Conference focused on the perspective of technical and vocational education and training for sustainable society to face the challenges of 21<sup>st</sup> century, globalization era, and particularly Asian Economic Community. To overcome the challenges, we need the innovation and change in human resources development. Technical vocational educational and training have essential roles to change the world of education and work in order to establish sustainable society.

Undoubtedly, TVET need to enhance the quality of learning by developing various model of active learning, including learning in the workplace and entrepreneurship. Create innovation and applied engineering as well as information technology. Improvement of management and leadership in TVET Institution, and development of vocational and technical teacher education.

Many ideas and research findings have been shared and discussed in the seminar, more than 176 papers have been collected and selected through scholars, scientists, technologist, and engineers'. as well as teachers, professors, and post graduates students who participated in the conference.

Eight keynote speakers have taken a part in the conference, namely Prof. Intan Ahmad, Ph.D. (Director general of learning and student affairs, Kemenristek Dikti) and Prof. Josaphat Tetuko Sri Sumantyo, Ph.D. (CEReS Chiba University) and Prof. Dr. Maizam Alias (UTHM Malaysia) and Prof. Ganefri, Ph.D. (Rector of UNP) and Prof. Dr. Ramlee bin Mustapha (UPSI Malaysia) and Prof. Nizwardi Jalinus, Ed.D. (Chair of TVET doctoral program, FT UNP) and Prof. Michael Koh, Ph.D. Dr. Fahmi Rizal, M.Pd., MT (Dean of FT UNP). They all have a great contribution for the success of the conference.

Finally, thank a million for all participants of the conference who supported the success of 4<sup>th</sup> International conference on TVET 2017 and most importantly, our gratitude to all scholars who support and tolerated our mistake during the conference.

Padang, 9 November 2017

**Prof. Dr. Nizwardi Jalinus, M.Ed**  
Chair of Scientific Committee

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# ASSESSMENT OF PRODUCT PROTOTYPE EXISTENCE AS A MEDIA OF LEARNING TO ACCELERATE THE TRANSFER OF TECHNOLOGY AND DIVERSIFICATION IN RURAL INDUSTRIES

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**ABSTRACT:** Small scale industrial enterprise development "gulo saka", among others, can be made through product diversification program, because during this production still focused on one type of product, namely brown sugar (in terms of regional language called gulo saka). Baggase of sugarcane as the rest of the production process has not yet been optimally utilized but can be processed into new products form one type of fuel briquettes (Baggase Briquetting Fuel/BBF). This is due to the lack of knowledge and ownership of technology among the craftsmen. This paper is part of the results of research that introduces a type of solid fuel Charcoal Briquettes and Biobriquettes made from sugarcane husks, which are prototypes/prototype (physical model) that has been tested in a laboratory-scale characteristics. The results can serve as milestones fit the grooves of thought development of new products in order of operations management, where subsequently introduced on craftsmen as a medium of instruction, as well as the cache implementation & concept education Jhon dewey in the framework of technology transfer for the pioneering efforts of product diversification in the process of production of small industries in rural areas.

*Keywords: Prototypes, technology transfer, diversification, baggase briquette*

## 1. INTRODUCTION

Media Indonesia (2007) [1] released the Internal report Energy Outlook issued by the Energy Information Agency of the United States mentioned the world's energy needs will reach twice the current needs, particularly fuel oil will reach 118 million barrels by 2030. This is a serious and potentially will impact on the set of an energy crisis, so it needs to be immediately addressed in, among others, the most acceptable is adopting alternative energy needs.

One step the adoption efforts is the availability of a wide range of diverse forms of energy other than the options/fuel oil in the middle of the community, among others can be reached through the development of a fuel briquette based sugar cane husks (Baggase Briquetting Fuel/BBF) on small industrial efforts of brown sugar in the Agam i.e. it does product diversification program which so far since the beginning of the people as the industry grew in the craftsmen were still focused on one type of product in the form of brown sugar.

Craftsman party hasn't been able to add this type of production variations such as utilizing & and processing waste/by-product of sugar cane into a new product that is worth the economic, because of the lack of ownership of applicative technology among them. As a first step and a forerunner of the activities in the process of diversification of products which are, have been the availability of a physical prototype shapes or product model that will be

produced and tested the results and can meet the requirements to be commercialized.

Introduction of research results in the form of product prototypes, that can serve as a medium of instruction in the ways of the production process/product manufacturing would accelerate the occurrence of technology transfer to the craftsmen of this industry. As the thought and consideration [2] that promote new ideas into people's lives & community (especially in rural areas) has its own difficulties, due to the tendency of limited knowledge and capabilities of the bernalar among them (the low education levels and difficulties in access to information/communication). The best way and it is quite potent in this course is through pilot projects, such as carrying and introducing a prototype product.

Through the introduction of a prototype of the product will not only help accelerate the process of technology transfer but also affects the change in attitude of the craftsmen to innovation and change. In addition, the introduction of a prototype and is followed by the activity of the involvement in the process of making the product also contains nuanced meaning education, where communities (craftsman) can learn through the roles and functions of a media education and the implementation of the concept of education Jhon Dewey.

## 2. RESEARCH METHODS

The approach was conducted in this research-oriented product development flow layout, beginning with the observations of the market needs and continued with research activities at the laboratory either translating consumer needs as well as be design work the draft procurement tools in fabricating & workshop (workshop) as well as machining work to test the chemical physics-experiment in limited (defined experiment) to get a prototype product. Furthermore, introduced to the craftsman through the model of research action (action research) and evaluation of the implementation of the program (program evaluation).

Departing from the concept development of products that will be introduced, then the research will follow the flow pattern as in Figure 1, with a number of technical creation and livelihood prototype or model of physical products (briquettes sugarcane).

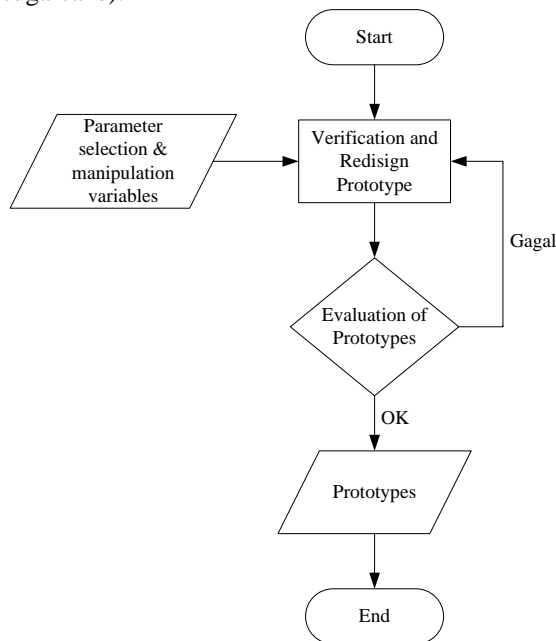


Figure 1. Flowchart Development Prototype Product

As for the whole stages and steps in the method in question is,

1. **Prototype creation and Livelihood**, that includes jobs in the effort to shape and concept ideas products briquettes, pre-design idea (sketch products), the physical architecture of the product, the finalization of ideas and creation, with the stages of development and employment penuluruhan prototype products. This step consists of the processes and technical work, starting with the preparation of the raw material in the form of sugar cane husks, until on the printing process and the corresponding technical pengempaan treatment (treatment) that has been specified.

2. **Testing and determining the choice of Prototypes**, i.e., advanced stages of physical prototype briquettes livelihood by performing tests in the laboratory and testing other fuel characteristics, required including the process of observation. All the testing and investigation on the point to determine the physical prototype options briquettes, which are technically feasible to produce/develop. Forms of work undertaken consists of penentuan number of test samples for each type of initial results of the prototype manufacture of briquettes in the first stage, until the process of testing the parameters of physical prototypes.

3. **Selection of the prototype**, and treatment information, namely in the form of the final stage of activities in deciding the concept of product to be introduced in the prospective producer (enter trial production of limited). Beginning with the physical prototype selection activities, followed by the test results and analysis as well as the determination of the selection decision against prototype options, especially on the calorific value briquettes cane dregs.

4. **The introduction of a prototype and the involvement of craftsmen**, i.e. in the form of demonstration activities selection result (prototype) and involve craftsmen to assess and further engage in the process of making products. In this step the prototype acts as media of education against the craftsmen, which will motivate their learning and stimulate the enthusiasm to want to do a change of attitude and a selection of new products into production. Figure 2 is a flowchart for a process of technology transfer and diversification program stub.

## 3. RESULTS AND DISCUSSION

### 1. Research results

Based on all of the requirements for the manufacture of a product prototype methods and procedures in the planned research as needed, then product design & obtained research results as follows:

#### a. Briquettes Prototype for Learning Media

The prototype was developed for the sake of reason consideration ease of application and technology transfer to industry craftsmen party gulo saka. To produce the prototype of all the basic materials required do some treatment in technical, by specifying a particular proxy or comparison between the basic ingredients of sugar cane pulp, adhesive materials tapioca flour/clay, add other ingredients and water to taste as well as a selection of powerful pressure different and other treatments such as warming and drying.



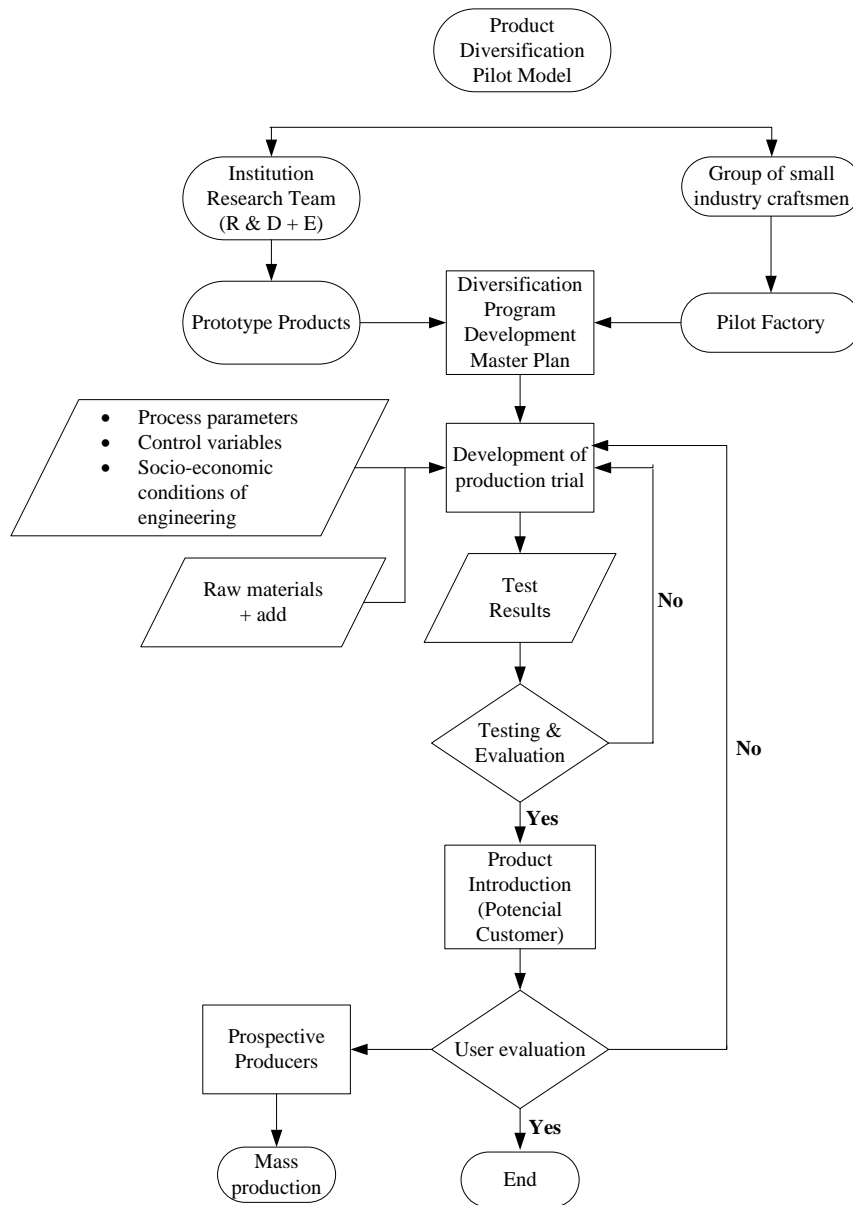


Figure. 2 Flowchart for process control of Technological Research Product diversification Program on & Craftmen



Prototype of Sugarcane Briquette Products Type I (Biobriquet)



Prototype of Sugarcane Briquette Products Type II (Black/Charcoal briquet)

Figure 3. Prototype Products for Learning Media and the Forerunner to the Process of Diversification Efforts

Figure 3. is a research prototype to be unveiled at saka sugar, craftsmen at once serve as media education to membelajarkan their conception of the product through the process of creation so that the occurrence of & imitation learning experience after him described all the procedural order and process defects. As the concept of media education in theory, pembelajaran is a tool that has the function of conveying the material, whereas learning is a process of communication between students, teachers, and materials. In this study, learners are the craftsmen of the sugar industry saka (community/group of craftsmen), the research team (developers) as a teacher/resource, and material is in the form of training and guidance materials manufacture of fuel briquettes dregs of sugar cane. According to Gestach and Ely [3], media learning when understood in outline is composed of elements of the human, material, or events that build the conditions that make the learners are able to acquire the knowledge, skills, and attitudes.

**b. The existence of the Prototype Against the results of the Training/Production Changes**

Change of production among other things can be done when something has industry and efforts to put forward the elements of creativity and innovation in the production line. This event usually occurs frequently in large scale industrial businesses through the Department's research & development (R & D), in order to maintain its existence in the middle of the competition is to always be in front and lead. Different from the case at the industrial businesses, where the absence of research costs and failed in the applicative technology ownership causes such change is always slow (stagnation) so that it can lead to lost updates and competition.

On the importance to the continuation of the process of technology transfer is need for innovation triangle (triangle of innovation) growth between the industry, universities, and Governments in an effort to provide assistance to small industrial businesses/people in the countryside. Research results of the College will be bridging the interests, and become a media learning to increase resource production, which can add information knowledge, skills and attitude changes into production.

The characteristics and scale of the effort smaller sugar saka industry, have been found [4] form are on condition of increasing return to scale at which level it is still beneficial to prospective and continue to be developed, including an expansion of efforts (diversification) or the addition of new products. A potential source of raw material for the development of abundant enough, and made from sugarcane (*saccharum officinarum*) and/or plant Tibarau or wild sugarcane (*saccharum spontaneum* Linn) as raw material substitution such as seen in Fig 4.



(a) the Sugarcane



(b) Tibarau/wild sugarcane

Figure 4. Pictures of potential Plant of making raw material for Briquettes Fuel

By reason of the potential will be consideration to the craftsmen introduced a type of solid fuel in the form of briquettes dregs of sugar cane, which is a discovery in the form of prototype and ready to enter the stage of commercialization. The introduction of a product prototype and existence of fuel briquettes will help the craftsmen of this industry in innovation, as well as the occurrence of the technology transfer process that is required in the activity of product diversification. Not only that, they also indirectly has introduced the activity of production processes cleaner without residual (clean production and non-standard processes residual principle) through the utilization of sugar cane husks as material for the rest of their production during this process to turn it into an alternative product.

Figure 5. exposing these people one of the industry with a pile of sugar cane husks as the rest of the production process, which it use in the framework of product diversification process.

The research method was used more partisipatif (Participatory Approach Model) and action (Action Research), where to the trainees who come from small industrial group member brown sugarcane (saka) introduced how to make or process of fuel briquettes made from cane dregs along with the equipment used. Visible atmosphere in the training provided, all the participants are very motivated and full of anger (passion) following each step in the technical work is done.



(a) Process of production Saka



(b) Raw material of bagasse

Figure 5. An example of the process of making Sugar Saka and the rest of Remaining of the sugarcane Industry

The enthusiasm they show it is well-grounded, for want of work training soon became part of the productive skills and future results can be realized as a form of new products from its industrial businesses. Figure 6 is one snippet at a time the atmosphere of training takes place, some participants were discussing training materials.

Based on the results of interviews with participants/craftsmen, generally they posited can quickly understand training materials on how technical workmanship/manufacture of fuel briquettes. This is according to those affected by the presence of an existing example of assistance namely prototype products/briquettes.



Figure 6. The situation mood of the Participant on the moment of Training Process

Sooth their works have established a significant learning experience against the results acquired, where among other things seen from a few examples of the results of their work (product of fuel briquettes) after carrying out the work/training as shown in Figure 7.



Figure 7. Trainee are Drying of Baggase Briquettes as a Result of his work

## 2. The Meaningfulness Of The Results Of Training And Educational Theories Jhon Dewey

Introduction of production process and of the training given to the small brown sugar industry craftsmen as a group of people's industries in rural community not apart in an effort to provide education and increasing knowledge and skills through a meaningful learning experience.

Related to the concept of thinking in education theory, when carried out discussions and will take apart-meaningfull contained, then the activity of training and the introduction of a prototype of the product can act as a medium of instruction for participants/craftsmen. Delivery activities reinforced & followed by the awarding of the training material based on style educational touch against the adults, then in this case is with the concept of educational thought developed by Jhon Dewey, who stressed the importance of creativity and student involvement in discussions and problem solving (principle of school work).

The involvement of craftsmen to do directly and dealing with issues of learning will give him meaningful, real experience and simultaneously form the attitude toward solving problems, particularly issues related to production (product innovation). In this context, the discussion against the results of the research is focused on training theory & John Dewey as an educator, though the conception of education that dirumuskannya very strong indigenous philosophical thought.

Can not be denied that the thoughts of many influential John Dewey on education today. Build experience and shaping the character of learners through the attitudes and views of the work and through training in the workplace (on the job training) as the concept of Jhon Dewey many thrive on industrial training center & school today.

Dewey's conception of education as a social process is applied not only to the children at the school but also to the Community (including by way of example to the Group of craftsmen industry folk in the countryside). Analysis of pragmatism John Dewey where pragmatism that etymologically derived from Greece, pragma meaning to, or something done, action work.

Dewey's thought patterns about education in line with the conception of the building, where instrumentalism basic concepts of experience (experience), growth (growth), experiment (experiment), and transaction (transaction) has an immediacy that is familiar, so that Dewey describes philosophy as a general theory of education. Education and the philosophy of interdependence with each other; where the dry educational philosophy, without going the direction of intelligence. In the book *Democracy and Education* [5] defines education as guide in intelligence to the development of the possibilities inherent in the custom experience.

If delaborasi further, the above can be interpreted as thinking that to be interested in something he should engage in transactions that is by experience, applicable to the pserta students or other organisms. The experience is a process which moves continuously from one stage to the stage of the reconstruction as a new problem, pushing intelligence to formulate a new proposal-proposal for action.

In principle, the development of the experience to come through the interaction of a range of activities in which education is primarily a social process. According to Dewey in *Experience and Education*, education is preparation. Thus, education is a reconstruction of the experience, step forward, for the preparation of the next. More John Dewey mentioned that a reflective method in solving problems, is an active thought process, careful, which is based on the process of thinking towards a definitive summary draws through five steps.

- a. Learners (craftsmen) recognize the problem, and that problem is coming from the outside dirinnya own.
- b. Next they will investigate and analyze the problem and determine the difficulties faced.
- c. Then he connects the blurb descriptions the results its analysis it or each other, and collect various possibilities to solve the problem. In the Act they are led by his own experience.
- d. Then they weigh the possible answers or hypothesis with the consequences of each.
- e. Then, they are trying to put into practice one of the chances of a resolution he saw best. The results will prove correct-whether solving it. When troubleshooting it is wrong

or inappropriate, it will be in another likely tried it until a proper solution is found. Problem solving that's right, that is useful for life.

#### 4. CONCLUSION

The from this activity can be concluded that:

- a. Small industry in this study is a kind of people's industries in the countryside, especially in the area of Minangkabau (Agam), with production still are traditional patterns with one type of product in the form of brown sugar/saka. The dregs remaining sugar cane production can be made into fuel briquettes and the potential to be commercialized.
- b. Prototype briquettes dregs of sugar cane research laboratory-scale results, can serve as a learning medium speed up technology transfer and opening the way for merinstis efforts to diversify business/product
- c. Educational Model for training introduction way & production process can give you the feel of the value of education in accordance with the meaning & approach school work Jhon Dewey, which can be widely applied not only in school but also to the community in the form of education and training work.
- d. The concept of education Jhon Dewey, more emphasis and emphasis the importance of the meaning of learning experiences that come from a variety of activities. Therefore, education is a reconstruction of experience, steps forward to the preparation of the next (in this context is related to the efforts of accelerating technology transfer preparation towards diversification & effort this small industry).

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