



CERTIFICATE

This certificate is awarded to

M Marniati and S C Wibawa

as **Presenter** of a paper entitled

Analysis of the important role of competency of business enterprises in the industrial work practice in era 4.0

in **The 3rd International Conference on Innovation in Engineering and Vocational Education (ICIEVE 2019) "Promoting Research in Engineering and Technical Education"**, Bandung, Indonesia, November 26, 2019



Prof. Dr. Didi Sukyadi, MA
Vice Rector for Research, Partnership, and
Business, Universitas Pendidikan Indonesia



Assoc. Prof. Ade Gafar Abdullah, M.Si.
Conference Chair



ICIEVE 2019

The 3rd International Conference on Innovation
in Engineering and Vocational Education



PAPER • OPEN ACCESS

Analysis of the important role of competency of business enterprises in the industrial work practice in era 4.0

To cite this article: M Marniati and S C Wibawa 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **830** 042067

View the [article online](#) for updates and enhancements.



LIVE AWARDS AND SPECIAL EVENTS

PLENARY LECTURE:
"Perovskite Solar Cells: Past 10 Years and Next 10 Years" with *Nam-Gyu Park*

LEGENDS OF BATTERY SCIENCE:
A Celebration with *M. Stanley Whittingham* and *Akira Yoshino*

PRiME 2020 • October 4-9, 2020
Hosted daily: 2000h ET & 0900h JST/KST

PRIME™
PACIFIC RIM MEETING
ON ELECTROCHEMICAL
AND SOLID STATE SCIENCE
2020

**ATTENDEES
REGISTER FOR FREE ▶**

The banner features several logos and portraits: a green 'e' logo, a circular portrait of Nam-Gyu Park, a circular portrait of M. Stanley Whittingham, a circular portrait of Akira Yoshino, and the Electrochemical Society logo.

Analysis of the important role of competency of business enterprises in the industrial work practice in era 4.0

M Marniati^{1,*} and S C Wibawa²

¹ Home Economics Department, Universitas Negeri Surabaya, Indonesia 60231

² Informatics Engineering Department, Universitas Negeri Surabaya, Indonesia 60231

*marniati@unesa.ac.id

Abstract. Advances in digital technology 4.0 become an opportunity for prospective college graduates as initial capital for entrepreneurship. College students can maximize academic competence and entrepreneurial skills through interaction with various partners during industry practice especially in the field of fashion. one of the technologies that can be utilized in the fashion industry is the use of Computer-Aided Design (CAD). The purpose of this study to determine the important role of fashion entrepreneur competence in industrial work practice in era 4.0. This study uses a quantitative approach, using the T-Test and Explanation Factor Analysis. The findings of this study are (1) industrial work practices in individual business units (boutiques, fashion houses, and fashion designers) are more effective than institutionalized business units (sewing courses, fashion design courses, and confectionary businesses), (2) entrepreneurial education has very high effectiveness in preparing practice by applying information technology to design using Computer-Aided Design (CAD).

1. Introduction

Industrial Revolution 4.0 is support for transformation to improve efficiency in supporting digital and production lines in industries that support sustainable technology development. Industry challenges and opportunities 4.0 Support and challenges of formal education, especially tertiary institutions. The competencies needed to start the 21st century and master the industrial revolution 4.0 are: 1) having the ability to think critically; 2) have the creativity and the ability to innovate; 3) have communication skills; 4) has the ability to collaborate and manage, and 5) having confidence [1].

In today's fast-paced business world, the Information Technology (IT) industry is constantly producing new technology. This also happens in the apparel/garment industry, it is very important to invest in emerging technologies to achieve competitive advantage and improve their operational efficiency by generating and improving decision-making processes, developing new business models, especially in fashion entrepreneurship.

This competency can be increased through fieldwork practice programs. One rapidly developing industry brings huge opportunities and challenges to the fashion industry. Therefore, students can take advantage of technological developments during field practice. One use of technology in fashion is Computer-Aided Design (CAD).

The CAD system has developed rapidly since it was introduced three decades ago. Especially the gap in connecting three-dimensional (3D) designs to two-dimensional (2D) patterns is accelerating due to 3D graphics technology. As a result, the pattern maker can now digitally make 2D CAD sewing



patterns by selecting segments on the pattern pieces that will be linked together (for example sewing sleeves to arms), digitally positioning sewing patterns around 3D body shapes, and running simulations to make a 3D Virtual Prototype. Creating a 3D virtual prototype allows users to understand how the product will look in reality and be useful in the early stages of product development [2]. Learning with Computer-Aided Design (CAD) is expected to increase entrepreneurial competence. Even the results of the study showed (1) fashion competence had a significant effect on work readiness for 'Cipta Karya'; (2) achievement motivation has a significant effect on work readiness for 'creative works'; (3) both variables are positive [3].

In this study, entrepreneurs are defined as individuals who have the capacity and are willing to start a profitable business, such as selling new or used fashion products, services related to fashion (for example fashion style consulting, designers, and others).

CAD is one of the technologies used in the fashion industry for mass customization production in the garment industry, making work more efficient and of better quality. Student fashion entrepreneurship competencies in various institutions have the opportunity to develop their expertise in industrial work practices in individual business units and with institutionalized business units. Specific Objectives (1) Knowing the effectiveness of industrial work practices in individual clothing units (boutiques, fashion houses, and designers), (2) Knowing the effectiveness of industry work practices in institutionalized business units (sewing courses, fashion design courses, and garment/convection business), (3) Knowing the effectiveness of fashion entrepreneurship competencies in industrial work practices in individual business units and institutionalized business units.

2. Literature review

2.1. Industrial work practices

Industrial Work Practices or Job Training are real activities because education is closely related to the world of work or industry, this practical learning plays a major role in equipping graduates to adapt to the actual work environment. Training is an attitude of learning to improve employee performance, the ability of employees to be improved through vocational training [4].

The training as the systematic development of knowledge, skills and attitudes needed by someone to effectively carry out the given task or job [5]. Training takes place at all levels of personnel, and trainees can vary in terms of age, work experience, disability, educational background, ethnic origin, and skill level. Industrial training has become an important part of many vocational education programs in the world, the relationship between academics and industry is seen as indispensable for student growth [6].

Implementation of job training is intended to obtain employment who have the knowledge, skills, abilities, and a good attitude to fill positions available jobs with high labor productivity, which can produce good work [4]. These industrial work practice activities provide great benefits for college students because of the industry work practices carried out in the business world can provide the experience that can shape the college student's personal professional, high-quality vocational skills that are able to be developed according to their line of work. Experience gained by college students in the business and industrial world can provide an overview of the working world. Thus, it is important that students are aware of the rationale for their training and understand how it can enhance their employability skills so that the objectives of the training program do not remain at the level of rhetoric [7].

2.2. Methods of making digital Computer-Aided Design (CAD) patterns

Extensive use of CAD tools, to create a standard set of patterns for each garment design. Either by using the block provided and modifying it on the screen or photographing an existing pattern with a digital camera and line/shape/curve pattern digitized on the screen above the pixel image or making a free-shaped pattern on the screen at the required length. Progress in Making Digital Patterns with the contribution of cad fashion, advances in pattern making occur in many of the fields described below, 1)

reducing the gap between buyers/designers and pattern makers, 2) costing, 3) making optimization markers, and 4) digital methods.

2.3. Merchandising in the garment industry

Merchandising, in the garment industry, is a piece of work that connects the marketing department and the production department. Merchandising is the work of handling production orders ranging from the order confirmation, sample making, submission of approval of production materials, procurement of production materials, production plans to completion of production until production is ready to send along with shipping and payment documents. Therefore, there are two types of work teams in merchandising, namely marketers (merchants) and merchandisers (merchandising agents) who both aim to gain profits and success [8].

In the garment industry, there are important parts or fields of work that are separate but interrelated and divided into several departments led by a department head (manager). Related to the part or field of work, several garment industries in Indonesia each have their own terms and names according to their function, size, and capacity.

According to Freyer and Celia, the organizational structure in the garment industry is below [9]:

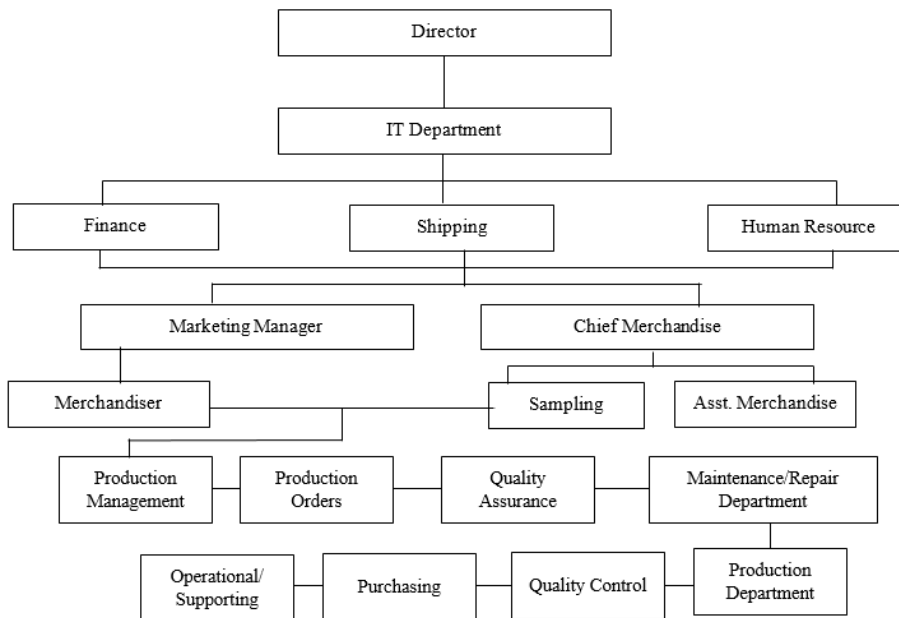


Figure 1. Chart of organizational structure in the garment industry.

3. Method

This research uses quantitative, research subjects are 80 undergraduate college students in Fashion Management discussing Field Work Practice in Industry. The method of data collection uses a questionnaire with a Likert scale model of five alternative answers and documentation. The data analysis technique used is the T-Test and Explanation Factor Analysis. The instrument validity test uses the Product Moment contention coefficient from Pearson, while the instrument reliability test uses the Alpha Cronbach value.

4. Results and discussion

4.1. Analysis of entrepreneurship learning outcomes

EFA results for entrepreneurial learning outcomes as much as 38% of the correlation coefficient changes with an absolute difference of more than 0.05, so the level of suitability of the model on this result is

72%. The results of exploratory factor analysis (EFA) from 24 items explaining entrepreneurial learning outcomes were extracted into 7 components with a cumulative variant of a total of 76.7%.

Table 1. Exploratory factor analysis of entrepreneurship learning outcomes.

| | Component | | | | | | |
|-----------------------------|-----------|-------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| B4.Risk2 | 0.884 | | | | | | |
| B4.Risk3 | 0.876 | | | | | | |
| B5.Orientation4 | 0.864 | | | | | | |
| B3.Creative2 | 0.850 | | | | | | |
| B3.Creative1 | 0.819 | | | | | | |
| B5.Orientation2 | 0.689 | | | | | | |
| B6.Lead4 | | 0.942 | | | | | |
| B3.Creative3 | | 0.929 | | | | | |
| B1. Honest1 | | 0.900 | | | | | |
| B4.Risk1 | | 0.854 | | | | | |
| B1. Honestly | | | 0.829 | | | | |
| B1. Honest4 | | | 0.821 | | | | |
| B6.Leaders2 | | | 0.766 | | | | |
| B6.Lead3 | | | 0.726 | | | | |
| B5.Orientation3 | | | | 0.873 | | | |
| B2.Mandiri2 | | | | 0.872 | | | |
| B2.Mandiri3 | | | | | | | |
| B5.Orientation1 | | | | | 0.822 | | |
| B6.Lead1 | | | | | 0.605 | | |
| B4.Risk4 | | | | | 0.503 | | |
| B2.Mandiri1 | | | | | | | |
| B3.Creative4 | | | | | | 0.789 | |
| B1. Honest3 | | | | | | 0.508 | |
| B2.Mandiri4 | | | | | | | 0.672 |
| Eigen Value | 5.58 | 4.96 | 2.01 | 1.74 | 1.55 | 1.27 | 1.21 |
| Varian Total (%) | 23.23 | 20.66 | 8.76 | 7.24 | 6.46 | 5.30 | 5.06 |
| Cumulative Varian Total (%) | 23.23 | 43.89 | 52.65 | 59.88 | 66.34 | 71.64 | 76.70 |
| Alpha Cronbach | 0.905 | 0.963 | 0.883 | 0.798 | 0.666 | 0.672 | 1.000 |
| Composite Reliability | 0.931 | 0.949 | 0.866 | 0.864 | 0.686 | 0.600 | 1.000 |
| Average Variance Extracted | 0.694 | 0.822 | 0.619 | 0.761 | 0.432 | 0.440 | 1.000 |

The main explanation of the results of entrepreneurial learning is in the first component with a contribution of 23.23%. This first component consists of: wanting to win the competition (B4.Risiko2), sacrificing time to complete assignments (B4.Risiko3), obeying the teacher's advice (B5.Orientation4), utilizing existing items to channel creations (B3.Creative2), utilizing less useful goods (B3.Creative1), immediately ask if there are difficulties (B5.Orientasi2). The second component consisted of 4 items which contributed 20.66% in explaining entrepreneurial learning outcomes. This component consists of: discuss with friends if there are thirteen challenges (B6.Lead4), happy to try new things (B3.Creative3), continue to do even though difficult (B1. Honest1), have a target when working (B4. Risk1). While the third component with a contribution of 8.76% consists of: discussing tasks with friends (B1. Honest2), sad and ashamed if there is a wrong assignment (B1. Honest4), happy to coordinate activities (B6.Lead2), and can accept suggestions and criticism (B6.Lead3). Entrepreneurship education has a very high effectiveness, proven to be able to make college students have a high orientation in preparing for practice, college students become more creative and innovative

in applying information technology in making designs with Computer-Aided Design (CAD), college students are bolder in working (acting) deliver productive practice material, college students are more assertive in conducting Production practices (risk).

4.2. Analysis of industrial work practices

The EFA results for work readiness have a fit model of 53%, which is as much as 53% the correlation coefficient changes with an absolute difference of more than 0.05. The results of exploratory factor analysis (EFA) from 20 items describing industrial work practices were extracted into 6 components with a cumulative total variance of 73.42%. The main explanation of industrial work practices is the first component with a contribution of 25.41%. This first component consists of 4 items: supervision at every practice presence (P1.SDM4), able to use tools according to procedures (P2.Expert3), create areas of expertise (P1.SDM2) and use established work procedures (P2.Expert2). The second component consists of 4 items that contribute 17.36% consists of: a good assessment from the instructor (P4. Value 1), obedience to the rules and procedures in the industry (P2.Expert4), arrive on time (P1.SDM1) and attitude towards new competencies (P5. Ready 4). While the third component with a contribution of 11.43% consists of only 6 items, namely: discussing if the work is considered difficult (P3.Communication4), asking for tasks to reduce errors (P3.Communication1), there is an MoU between the place of practice with the industry (P5.Ready2), appreciation from the instructor (P1.SDM3), discussion if there are difficulties (P3.Communication3), and are able to properly use CAD (P2.Expert1).

Table 2. Exploratory factor analysis of industrial work practices.

| | Component | | | | | |
|-----------------------------|-----------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| P1.SDM4 | 0.945 | | | | | |
| P2.Expert3 | 0.938 | | | | | |
| P1.SDM2 | 0.938 | | | | | |
| P2. Expert2 | 0.938 | | | | | |
| P4. Value1 | | 0.941 | | | | |
| P2. Expert4 | | 0.941 | | | | |
| P1.SDM1 | | 0.863 | | | | |
| P5. Ready4 | | 0.762 | | | | |
| P3.Communication4 | | | 0.800 | | | |
| P3.Communication1 | | | 0.791 | | | |
| P5. Ready2 | | | 0.718 | | | |
| P1.SDM3 | | | 0.616 | | | |
| P3.Communication3 | | | 0.615 | | | |
| P2. Expert1 | | | 0.600 | | | |
| P4. Value 2 | | | | 0.799 | | |
| P4. Value 4 | | | | 0.666 | | |
| P3.Communication2 | | | | | 0.794 | |
| P5. Ready3 | | | | | 0.718 | |
| P4. Value 3 | | | | | | 0.814 |
| P5. Ready1 | | | | | | 0.643 |
| Eigen Value | 5.08 | 3.47 | 2.29 | 1.35 | 1.32 | 1.19 |
| Varian Total (%) | 25.41 | 17.36 | 11.43 | 6.74 | 6.58 | 5.93 |
| Cumulative Varian Total (%) | 25.41 | 42.75 | 54.17 | 60.91 | 67.49 | 73.42 |
| Alpha Cronbach | 0.905 | 0.963 | 0.883 | 0.798 | 0.666 | 0.672 |
| Composite Reliability | 0.931 | 0.949 | 0.866 | 0.864 | 0.686 | 0.600 |
| Average Variance Extracted | 0.694 | 0,822 | 0.619 | 0.761 | 0.432 | 0.440 |

Study Programs, Industry, Lecturers, and college students, benefit from effective Field Work Practices in Industry. Two important things in work practice are to form qualified human resources and have sufficient expertise competence.

4.3. Differences in learning outcomes for entrepreneurship and industrial work practices

Test results of differences in learning outcomes for entrepreneurship and industrial work practices between individual Business Units (Boutiques, fashion houses, and fashionists) compared to institutionalized Business Units (institutions: sewing courses, fashion design courses, and confection efforts) are described in Table 3. Entrepreneurship learning outcomes in individual business groups have a higher average (113.08) and are significantly different ($p < 0.05$) when compared to institutional business groups (107.90). Likewise, the results of industrial work practices of individual business groups have a higher average (90.63) and are significantly different ($p < 0.05$) when compared to institutional business groups (87.85).

Table 3. Average difference test results.

| Variable | Group | N | Average | t | p |
|------------------------------------|----------------------|----|---------|-------|-------|
| Entrepreneurship Learning Outcomes | Business Institution | 40 | 107.90 | 7.364 | 0.000 |
| | Individual Business | 40 | 113.08 | | |
| Entrepreneurship Learning Outcomes | Business Institution | 40 | 87.85 | 2.998 | 0.000 |
| | Individual Business | 40 | 90.63 | | |

5. Conclusion

The findings of the study are (1) industrial work practices in individual business units (boutique, home mode, and fashion) are more effective, compared to institutionalized business units (institutions: special, design courses, and business confection) (2) entrepreneurship education has a very high effectiveness, proven to make college students have to make an effort to make preparations, college students become more creative and innovative in developing information technology in making designs with Computer-Aided Design (CAD), college students who are more courageous in their work (trying to) deliver productive practice materials, college students are more assertive in practicing Production (risk), (3) Study Programs, Industry, Lecturers, and college students, benefiting from effective Field Work Practices in Industry.

References

- [1] Gökalp E, Gökalp M O and Eren P E 2018 *Hazır Giyim Ve Konfeksiyon Sektöründe Endüstri 4.0* (Devrimi: Akıllı Konfeksiyon Fabrikası)
- [2] Chang Y S, Chien Y H, Lin H C, Chen M Y and Hsieh H H 2016 Effects of 3D CAD applications on the design creativity of students with different representational abilities *Computers in Human Behavior* **65** 107-113
- [3] Wibawa S C 2018 The impact of fashion competence and achievement motivation toward college student's working readiness on "Cipta Karya" subject *IOP Conference Series: Materials Science and Engineering* **296**(1) 012017
- [4] Hasibuan H A, Purba R Br and Siahaan A P U 2016 Productivity Assessment (Performance, Motivation, and Job Training) using Profile Matching *SRRG International of Economics and Management Studies* **3**(6) 73-77
- [5] Patrick J 2000 "Training," In Chmiel M (Ed.) *Introduction to work and organizational psychology* (Oxford, UK: Blackwell Publisher Ltd.) pp 100-125
- [6] Ayob A, Jamaluddin N, Osman S A, Omar M Z, Kofli N T and Johar S 2013 Undergraduate Industrial Training Experience: A Win-win Situation for Students, Industry, and Faculty *Procedia Social and Behavioral Sciences* **102** 648-653
- [7] Pillai S, Khan M H, Ibrahim I S and Raphael S 2012 Enhancing employability through industrial training in the Malaysian context *High Education* **63** pp 187-204

- [8] Widiastuti 2017 *Merchandising di Industri Garmen* (Yogyakarta: UNY Press)
- [9] Freyer T and Celia S 2006 *The Factory: Materi Pelatihan Garmen* (Bogor: IGTC)