



**2019 AASE  
INTERNATIONAL  
CONFERENCE**

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**BESM-28  
ETAS-27**

- *28th International Conference on Business, Education, Social Science, and Management*
- *27th International Conference on Engineering, Technology and Applied Science*

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JUN · 18-19 · 2019 @ SEOUL/KOREA





**PROCEEDINGS OF  
27<sup>th</sup> ETAS & 28<sup>th</sup> BESM Conference**

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Applied and Advanced Science Exchange (AASE)

**Published by**



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**International Conference on Engineering, Technology and Applied Science (ETAS)**

- 27<sup>th</sup> ETAS @ Seoul/South Korea, Jun 18<sup>th</sup>-19<sup>th</sup>, 2019

**International Conference on Business, Education, Social Science, and Management (BESM)**

- 28<sup>th</sup> BESM @ Seoul/South Korea, Jun 18<sup>th</sup>-19<sup>th</sup>, 2019

Conference organizer: Applied and Advanced Science Exchange (AASE)

Publisher: ETAS/BESM Academic Press

ISBN Code: 9789869748421

Website: <https://www.aaseconference.org>

Mail: [Secretary@aaseconference.org](mailto:Secretary@aaseconference.org); [Contact.us@aaseconference.org](mailto:Contact.us@aaseconference.org)

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## **EDITORIAL**

It is my proud privilege to welcome you all to the AASE International Conference at Seoul/South Korea on June 18<sup>th</sup>-19<sup>th</sup>, 2019. AASE International Conference serves as platform that aims to provide opportunity to the academicians and scholars from across various disciplines to discuss interdisciplinary innovations. We are happy to see the papers from all part of the world published in this proceedings. This proceeding brings out the various Research papers from diverse areas of science, engineering, technology, management, business and education. These articles that we received for these conferences are very promising and impactful. We believe these studies have the potential to address key challenges in various sub-domains of social sciences and applied sciences. I am really thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. I am also thankful to our scientific and review committee for spending much of their time in reviewing the papers for these events. I am sure the contributions by the authors shall add value to the research community.

Editor-In-Chief  
**Dr. H. Miyamoto**

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★★★



**Part one:**

**Topic on Business, Education, Social Science, and  
Management**

Editor by Dr. Eddie K.W. Li  
Hong Kong University



## Improving the Restructuring of Distressed Assets through Securitization on Emerging Markets

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### **Abstract**

This article reveals the concept of asset securitization as one of the mechanisms for improving the business through the transfer of selected, homogeneous assets to a special financial purpose vehicle. The definitions of the types of mechanisms for restructuring and improving enterprises in Kazakhstan are given. It is concluded that the asset securitization mechanism can be successfully applied in a rapidly changing business environment, and can also be used widely enough for companies to attract an additional long-term funding source.

**Keywords:** Securitization, Risk management, Capital markets, Stock market, Bond issue

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- *This research presented on 28th International Conference on Business, Education, Social Science, Management (BESM-28): Seoul/South Korea, Jun. 18<sup>th</sup>-19<sup>th</sup>, 2019*

## 1. Introduction

Nowadays Kazakhstani stock market may prove to be a worthy alternative financial sector, which diversifies the base for attracting long-term financing, both for speculators and for strategic investors. The international rating agency S&P Global Ratings recently confirmed the long-term and short-term sovereign credit ratings in foreign and national currency of Kazakhstan at the level of BBB-/A-3. The agency expects that the country's sovereign and external balance to remain viable. However, after a series of high-profile defaults and a wave of subsequent restructurings that took place in 2008–2009, it has a narrow-limited toolkit and still provides access only to a certain variety of poorly illiquid quasi-state institutional players.

The current state of the economy of Kazakhstan allows, on the one hand, to improve risk management mechanisms, and on the other hand, to introduce alternative investment tools that have already proved themselves from the best abroad, which allow to find alternative sources of financing for business. In the period from 2000 to 2007, second-tier banking system of the Republic of Kazakhstan acted as the most active and innovative part in terms of attracting liquidity in the stock market. Commercial banking put together and transferred bad assets to the balance of a new created special financial institution through the securitization mechanism. These assets were formed into a homogeneous pool and had the same properties in terms of credit risk exposure. For example, such an asset could be mortgage loan with the same maturity, interest rate. Further, a special financial company (the abbreviation from SPV stands for special purpose vehicle), under the provision of these assets, issued bonds and, through their placement, attracted liquidity, which transferred to a commercial bank. Various bond credit ratings could be assigned to different bond issues, reflecting the risk of default and the likelihood of full redemption of these debt securities.

## 2. Theoretical issues

The term "securitization" is formed from the word "securities": it is a type of financial instrument. Securitization is the process of financing an enterprise for the assignment of a monetary claim by issuing bonds secured by dedicated assets [4].

Bond (Latin obligatio - obligation; English bond - long-term, note - receipt) - by issuing debt security, the owner of which has the right to receive from the person who issued it (the issuer of the bond), in the stipulated time frame, its nominal value in cash or otherwise property equivalent. Also, a bond may provide for the right of the owner (holder) to receive a percentage (coupon) of its nominal value or other property rights. The investor's income can consist of two components: periodic payments in the agreed amount (coupon yield) and the difference between the purchase price of the bond and the repayment price (discount income).

Often there are bonds with a floating interest rate, which is tied to the rates of the interbank market, refinancing or other financial indicators.

One of the most vivid, real-life examples is the Kazakhstan Mortgage Company JSC (currently, the main shareholder is Baiterek JSC), which from the very beginning of its foundation acted as a mortgage agent and issued mortgage bonds (mortgage backed securities), which were secured the rights of claims on long-term mortgage loans. In 2002, the first mortgage bonds were issued, which allowed the company to attract new liquidity and provide it to second-tier banks through the subsequent redemption of rights of claim.

In the period 2008-2009, large commercial Kazakhstani banks faced a default on their debt obligations, a subsequent decrease in credit ratings and could not completely reduce their debt burden in time and improve their own balance. Some of the assets on mortgage loans were restructured, some of the debts were written off, but the situation has not changed in a positive direction over the past five years. The requirement of the local financial regulator in the person of National bank of Kazakhstan to increase the capitalization of the banking sector has noticeably tightened the limits, and now it is FPK JSC (troubled loan fund) that bears the main burden on releasing distressed long-term assets and their subsequent restructuring of stressful assets.

At the same time, lending to the economy in the real sector has noticeably slowed down, and the corporate segment of medium-sized and large-cap companies every year suffers from a deficit of long-term funding to ensure further business growth. However, country credit ratings have recovered, and in the Kazakhstan banking sector over the period 2016–2018, long-term investor confidence is still at the minimum critical levels. This is due to unresolved issues related to the minimization of credit risks and the recovery of debt obligations of the second-tier banks themselves.

The tremendous liquidity of cash placed on deposits in second-tier banks is accumulated in correspondent accounts with the National Bank of the Republic of Kazakhstan starting in 2015 and is not redistributed for lending to Kazakhstan business. The problem lies precisely in the reluctance of banks to bear the increased credit risks associated with the ability to service the debt and are quite comparable with the current state of the economy. The rate of return on the notes of National Bank of Kazakhstan covers inflationary expectations and makes it impossible to bear the increased credit risks of already problematic enterprises that did not solve the problems of a decade ago and stagnate due to the lack of opportunity to refinance default loans.

As a result of stagnant intra-economic processes, some Kazakhstani enterprises are beginning to independently develop and find alternative sources for the search for medium-term funding. Thus, through the allocation, transfer and subsequent sale of

less-liquid assets, it is possible to attract medium-term liquidity through new long-term financial instruments. Below is the classic scheme of the asset securitization transaction:

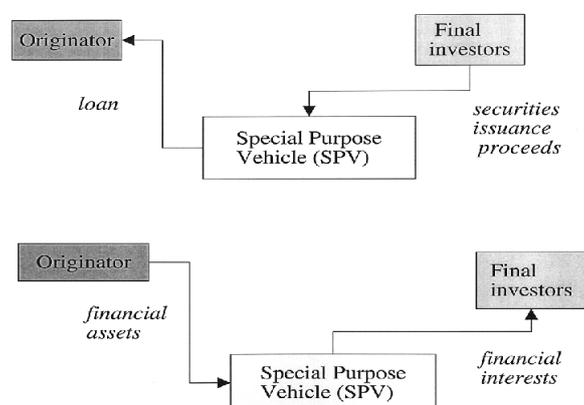


Figure 1. Classic asset securitization mechanism

On the practical side of this issue, there are no restrictions on the use of this asset securitization scheme. As assets can be any property rights, whether it be car loans, leasing payments, intellectual property rights. In turn, assets must meet certain credit risk properties: to be homogeneous, to generate stable calculated and projected cash flows, and also have the ability to be legally separated from the originator. Originator is a legal entity performing the assignment of rights of claim when concluding a securitization transaction [4]. Currently, Kazakhstani legislation allows local securitization transactions with various types of assets on the balance sheet of an enterprise. This gives additional impetus to the development of more advanced exotic financial instruments.

### 3. Findings

All the advantages and benefits for the potential investor-bondholder consider further. First of all, the investor manages operational risk through a transparently regulated infrastructure. The protection of the regulator is formalized through several Kazakhstani laws: “On joint-stock companies”, “On the securities market”, “On securitization and project financing”. The custodian bank is the custodian that maintains records of the assets allocated, and a coupon payment is paid from the custodial account to the bondholders and the principal amount is repaid. Asset audits are conducted on an annual basis by both the originator and the special purpose company. The law provides for the function of a representative of bondholders: it can be performed by a licensee-broker-dealer. It is this financial institution that provides the quarterly report to the regulator on solvency and prevents the risk of default by the issuing company.

Secondly, collateral (rights of claim) on debt securities provides an opportunity to minimize the credit risks on the part of the issuer. Thirdly, the investor has the full right to implement this instrument in the secondary stock market. Thus, the potential investment attractiveness of bonds of a special financial company provides additional liquidity to current investors-lenders. Fourth, for individual investors, exemption from individual income tax is still provided. Remuneration on coupon bonds in Kazakhstan is taxed-exempt and taken into account at a zero rate. Tax optimization in accordance with the Kazakhstan legal field has a positive effect on the issue and placement of these securities for the development of a number of securitization of assets of new issuers.

It is impossible not to note the possible disadvantages in the implementation of this alternative financing for the banking sector of Kazakhstan. On closer examination, the scheme no longer looks so unambiguous due to several factors. When conducting securitization, the procedures related to the quality assessment and the fair value of securitized loans are quite important. Doubts about the official estimates of the quality of bank assets are weighty today. On the underestimated level of problem loans (NPL - non performing loans) of Kazakhstan banks with enviable consistency, all rating agencies say. The reserves and provisions accrued and reflected in the equity capital of the bank are one of the indicative indicators of the real financial position of the balance. Under these conditions, there are concerns that banks have the ability to deliberately overestimate the quality of assets included in pools of securitized loans, which will allow them to some extent manipulate regulatory financial reporting. This factor should be taken into account when assigning a rating in assessing the quality of securitized assets.

It should be noted that the above-described asset securitization mechanism is of particular value today, as it allows not only to attract additional funding, but also to heal stressful assets on the balance sheet of the company, which reduce the investment attractiveness of the business itself. The development of the local asset securitization market will allow attracting international investments.

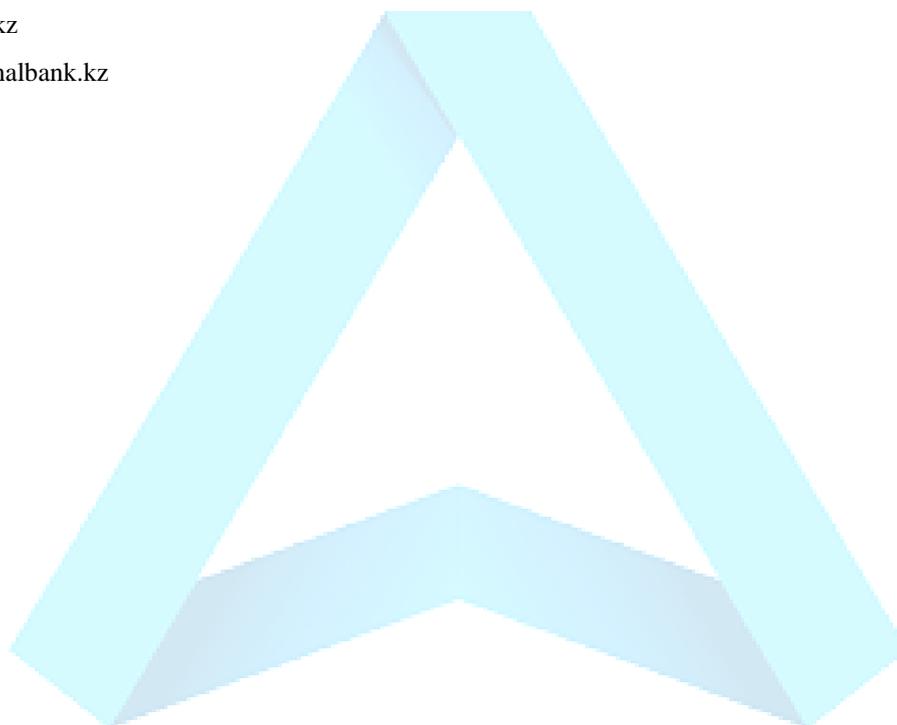
#### **4. Conclusion**

It is obvious to set up that for the successful development of the local asset securitization market in Kazakhstan, it is necessary to eliminate the imperfections of Kazakhstani legislation and develop new legislation in the field of asset securitization. In the short term, local asset securitization has the potential to be used as an effective tool for implementing anti-crisis measures in the Kazakhstani economy. Right now, the urgent need of both one hundred investors and companies from the real sector, the diversification in the provision of new investment instruments will improve liquidity and give a new impulse for the

development of the Kazakh economy and GDP growth in the country in the nearest future.

## 5. References

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## Utilizing Perma Model to Enhance Job Satisfaction: The Case of Mongolia

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### Abstract

The aim of this study seeks to examine the correlations between five components of well-being PERMA (Positive emotion, Engagement, positive Relationships, Meaning, and Accomplishment) model's acronym and job satisfaction. Then, our study is to investigate impacts of PERMA model's on job satisfaction in Mongolian public sectors and to evaluate their effects. We try and understand the factors which influence the acronym, as well as the consequences of it. We collected and analyzed data from descriptive research can help understand factors on job satisfaction. The data were collected from 138 participants who work in the public sector. This study discussed the effects of above mentioned results, the implications for theory and practice along with the limitations. We used PERMA model in our study. Our study is significant in considering both theoretical and practical issues and for practices in public sector. Data were estimated by SPSS 21 and Smart PLS 3.0 statistic programs.

**Keywords:** Mongolia, Job satisfaction, Positive emotion, Engagement, Relationships, Meaning, and Accomplishment.

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➤ *This research presented on 28th International Conference on Business, Education, Social Science, Management (BESM-28): Seoul/South Korea, Jun. 18<sup>th</sup>-19<sup>th</sup>, 2019*

## **1. Introduction**

Job satisfaction is showing positive effects on human resources in organization. Job satisfaction is one of the main influential factors for the effectiveness and success for human resource development. The rationale for the study describes why examining impacts on job satisfaction in Mongolia is important. Many scientists have suggested that job satisfaction is an important ingredient for evaluating an organization's effectiveness. Job satisfaction is an individual matter and the result of various specific attitudes possessed by an employee. Recently, in the public sector, job satisfaction and its impacts have become considerably significant and also to be social realities and social expectations. It is a main factor of their social life due to spending more time in their job. The employees who are satisfied with their jobs would be responsible in their job, committed to their job and motivated to develop in their organization for the future.

In this study, we try to study more theoretical framework of job satisfaction in position among public officers in Mongolia. In other words, we attempt to study officers in one sector with different positions. Then we would like to relate between five components of well-being PERMA model and job satisfaction in the public sectors in Mongolia.

Seligman (2011) suggests five components of well-being, and developed a new model of well-being which he called PERMA (PERMA is an acronym formed from the first letters of each domain defined by Seligman as a determinant of wellbeing). Seligman's new theory posits that well-being consists of the nurturing of one or more of the five following elements: Positive emotion, Engagement, Relationships, Meaning and Accomplishment. Positive emotions are the good things that we feel, such as happiness, hope, and joy (Cohn and Fredrickson 2009; Fredrickson 2001; Seligman 2011). A second important indicator of well-being is engagement—the act of becoming highly absorbed, interested, or focused in life activities (Csikszentmihalyi 1988). Feeling valued by others and having close, mutually satisfying relationships is another key indicator of well-being (Ryan and Deci 2000; Seligman 2011). A fourth indicator of well-being is meaning—having a sense of purpose derived from something viewed as larger than the self (Seligman 2011; Steger et al. 2009). Finally, striving for achievement (or accomplishment), the fifth indicator of well-being, is described by Seligman (2011) as a persistent or determined drive to master or accomplish something for one's own sake. The aim of our study is to investigate impacts of five components of well-being on job satisfaction in Mongolian public sectors and to evaluate their effects.

## **2. Conceptual Framework and Hypothesis**

### **2.1 Job Satisfaction**

In this study, to begin the discussion on job satisfaction we needed to logically begin

with a definition of job satisfaction. There are many scholars studied job satisfaction such as Hoppock (1935) offered one of the earliest definitions of job satisfaction, Bullock (1952) defined job satisfaction as an attitude, Smith (1955) it as an employee's judgment of how well his or her job has satisfied his various needs, Blum and Naylor (1968) defined it as a general attitude formed as a result of specific job factors, individual characteristics and relationships outside the job and Locke (1969) which overall viewed job satisfaction as the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's values. Vroom (1982) defined job satisfaction as workers' emotional orientation toward their current job roles. Also, Schultz (1982) stated that job satisfaction is essentially the psychological disposition of people toward their work. There are numerous theories attempting to explain job satisfaction, but three conceptual frameworks as content, process and situational theory seem to be more prominent in the literature. A summary of relevant theories such as three conceptual frameworks are shown below Table 1

Table 1: A Summary of Relevant Theories (Oluwatade, 2014)

Category	Theory	Authors
CONTENT	Need Hierarchy Achievement Theory Two-Factor X and Y theory Existence, Relatedness and Growth	Maslow 1943 McClelland 1958 Herzberg 1959 McGregor 1960 Alferder 1969
PROCESS	Equity Theory Expectancy Goal setting	Adams 1963 Vrooms 1964 Locke 1968

The *first conceptual framework* is *CONTENT THOERY*, which suggests that job satisfaction occurs when one's need for growth and self-actualization are met by the individual's job. Maslow's (1954) traditionalist views of job satisfaction were based on his five-tier model of human needs. According to Maslow, the needs of an individual exist in a logical order and that the basic lower level needs must be satisfied before those at higher levels. His theories parallel many other theories of human developmental psychology, some of which focus on describing the stages of growth in humans. Maslow used the terms "physiological", "safety", "belongingness" and "love", "esteem", "self-actualization", and "self-transcendence" to describe the pattern that human motivations generally move through (Nel et al., 2004). Building on the theories of Maslow, Frederick Hertzberg (1974, cited in Worrell, 2004) suggested that the work itself could serve as a principal source of job satisfaction. Hertzberg's "Two-Factor Theory" recognized that work characteristics generated by dissatisfaction were quite different from those created by satisfaction. Essentially, job satisfaction depends on the extrinsic characteristics of the job, in relation to the job's ability to fulfill ones higher level needs of self-actualization (Cristina, 2011).

McClelland's "Achievement Motivation Theory" in work situations is in his 1961 book "The Achieving Society". He expounds on his acquired-needs theory. He proposed that an individual's specific needs are acquired over time and are shaped by one's life experiences. He described three types of motivational need. A person's motivation and effectiveness in certain job functions are influenced by these three needs such as acquired needs are found to varying degrees in all workers and managers, and this mix of motivational needs characterizes a person's or manager's style and behavior, both in terms of being motivated, and in the management and motivation others (Trevino, L. K et al., 2003).

McGregor developed a philosophical view of humankind with "Theory X and Theory Y" in 1960. His work is based upon Maslow's Hierarchy of Needs, where he grouped the hierarchy into lower-order needs "Theory X" and higher-order needs "Theory Y". He suggested that management could use either set of needs to motivate employees, but better results would be gained by the use of Theory Y, rather than Theory X. These two views theorized how people view human behavior at work and organizational life.

Theory X assumes that employees are naturally unmotivated and dislike working, and this encourages an authoritarian style of management. According to this view, management must actively intervene to get things done. X-Type organizations tend to be top heavy, with managers and supervisors required at every step to control workers. There is little delegation of authority and control remains centralized. McGregor recognized that X-Type workers are in fact usually the minority, and yet in large scale production environment, X Theory management may be required and can be unavoidable.

Theory Y shows a participation style of management that is de-centralized. It assumes that employees are happy to work, are self-motivated and creative, and enjoy working with greater responsibility. It assumes that workers: Take responsibility and are motivated to fulfill the goals they are given, seek and accept responsibility and do not need much direction, and consider work as a natural part of life and solve work problems imaginatively. In Y-Type organizations, people at lower levels of the organization are involved in decision making and have more responsibility (Jason S, Wrench, 2010).

In an attempt to line up Maslow's Theory of Needs with empirical studies, Alderfer's "ERG Theory" elicits three core requirements: Existence, Relatedness, and Growth. This categorization reduction is the result of earlier research on Maslow Hierarchy of Needs that indicates some overlap within the middle levels. According to Alderfer, the needs aren't in any order and any desire to fulfill a need can be activated at any point in time. This results in the lower level needs not requiring to be satisfied in order to satisfy a higher-level need. Alderfer's ERG Theory can actually be utilized as a frustration-regression principle where an already satisfied lower level need can be "re-activated" when confronted with the

impossibility of satisfying a higher level one.

*Existence*: Relates to a person's physical needs such as food, clothing, and shelter.

*Relatedness*: Relates to a person's interpersonal needs within his personal as well as professional settings.

*Growth*: Relates to a person's needs of personal development (Alderfer, 1972).

The second conceptual framework is *PROCESS THEORY*, which attempts to explain job satisfaction by looking at how well the job meets one's expectations and values. First developed in the early 1960s by behavioral psychologist John S. Adams, "Equity Theory" is concerned with defining and measuring the relational satisfaction of employees. The "Equity theory" was based on the premise that job satisfaction is a direct result of individuals' perceptions of how fairly they are treated in comparison to others. This theory proposes that people seek social equity in the rewards they expect for performance. In other words, people feel satisfied at work when the input or contribution to a job and the resulting outcomes are commensurate to that of their coworkers (Gruneberg, 1979). Vroom (1964, 1982) theory of job satisfaction was similar in that it looked at the interaction between personal and workplace variables; however, he also incorporated the element of workers' expectations in his theory. The essence of this theory is that if workers put forth more effort and perform better at work, then they will be compensated accordingly. Discrepancies that occur between expected compensation and actual outcome lead to dissatisfaction. If employees receive less than they expect or otherwise feel as if they have been treated unfairly, then dissatisfaction may occur.

Conversely, overcompensation may also lead to dissatisfaction and the employee may experience feelings of guilt. The compensation does not have to be monetary, but pay is typically the most visible and most easily modified element of outcome. Salary also has significance beyond monetary value and the potential to acquire material items. Vroom (1964) "Expectancy Theory" explained that employees would choose to do or not do job tasks based on their perceived ability to carry out the task and earn fair compensation. Vroom's "Expectancy Theory" of employee motivation assumes that behavior results from conscious choices among alternatives whose purpose it is to maximize pleasure and minimize pain. Together with Edward Lawler and Lyman Porter, Victor Vroom suggested that the relationship between people's behavior at work and their goals was not as simple as was first imagined by other scientists. Vroom realized that an employee's performance is based on individual's factors such as personality, skills, knowledge, experience and abilities. Vroom took inspiration from this and worked on a general formulation of a theory dealing with the interaction of individual differences and situational variables. The result was his creation of the VIE Theory (Valence, Instrumentality, Expectancy) or "Expectancy Theory" as published

in Work and Motivation (Vroom 1964). In Vroom's formula each variable is given a probability value, and when all three factors are high, workers will be more satisfied and have more motivation. If any of the factors are low, work performance and employee motivation will decline (Gruneberg, 1979).

According to Locke's "Goal setting theory", people who have more difficult but attainable goals perform better than those who have less difficult goals. Goals can be either directional goals or accuracy goals. The former are goals people work toward without knowing the precise steps to take to achieve them and hence are more motivational. Accuracy goals on the other hand are characterized by careful planning to identify the best paths to achieve the goals with minimal deviations (Latham, 2004).

Goals can motivate people toward accomplishing them based on the extent to which they have clarity, challenge, commitment, feedback, and task complexity. Lack of accomplishment of goals leads to job dissatisfaction. Thus, Goal Setting Theory can be useful in predicting job satisfaction. Job satisfaction is an important attribute for employee productivity and commitment to the organization. Parker et al., (2009) found that autonomy in the workplace improves self-efficacy, which improves performance towards reaching goals. Within this idea is the vision and structure that goal setting provides, which helps to motivate individuals and teams to perform better and do more (Sorrentino, 2006).

## **2.2 Positive psychology**

Positive psychology is the study of happiness, flourishing, and what makes life worth living. Positive psychology is a quite new branch of psychology the roots of which can be traced back to Martin E. P. Seligman's 1998 Presidential Address to the American Psychological Association (Seligman, 1998). As APA president, Seligman initiated a shift in psychology's focus toward more positive psychological topics, such as well-being, contentment, hope, optimism, flow, happiness, savoring, human strengths, and resilience. In contrast with the classical focus of psychology on curing mental illness, positive psychology emphasizes understanding the factors that build strengths, help people to flourish and contribute to mental health, as well as on subjective wellbeing and happiness. All of these factors and processes may underlie optimal human functioning (Agota Kun8 Peter Balogh etc, 2017).

Work represents an important context for studying the wellbeing of individuals, especially because it provides different sources that impact on mental health, optimal social functioning and performance, and because it demands a significant portion of an employees' time and effort. Studying employee well-being is a very popular topic of research interest and, as a result, researchers have revealed various and numerous dimensions of work-related

well-being. While early studies primarily focused on problems faced by employees (e.g. stress, burnout, and dissatisfaction), recently more and more of research has focused on the positive side of employee well-being and on strengths (Calabrese et al., 2010). Why is employee well-being so important? Individuals' experiences at work are they emotional or social in nature obviously affect them. Well-being can potentially affect both workers and organizations in different ways. Workers with poor well-being may be less productive, make lower quality decisions, be more prone to be absent from work, and make consistently diminishing overall contributions to organizations (Price and Hooijberg, 1992).

Seligman (2011) suggests five components of well-being, and developed a new model of well-being which he called PERMA (PERMA is an acronym formed from the first letters of each domain defined by Seligman as a determinant of wellbeing). Seligman's new theory posits that well-being consists of the nurturing of one or more of the five following elements: Positive emotion, Engagement, Relationships, Meaning and Accomplishment. The five domains essential to well-being are:

Positive emotions: Good feelings motivate many human actions. Individuals read, travel or do whatever makes them feel happy and joyful. Positive emotions enhance performance at work, boost physical health; they strengthen relationships, and create optimism and hope for the future.

Engagement: This refers to attachment, involvement, concentration, and the level of inclination towards activities such as recreation, hobbies, or work (Higgins, 2006; Schaufeli et al., 2006). A key concept is flow, when time seems to stand still and one loses one's sense of self, and concentrates intensely on the present. In positive psychology, flow' describes a state of utter, blissful immersion in the present moment. When we focus on doing the things we truly enjoy and care about, we can begin to engage completely with the present moment and enter the state of being known as 'flow' (Seligman, 2011).

Relationships: We have a strong inner need for connection, love, physical and emotional contact with others. We enhance our own well-being by building strong networks of relationships around us with all the other people in our lives. Positive relationships, such as strong ties with family and friends or weak ties with colleagues, lead to a sense of belonging (Sandstrom and Dunn, 2014).

Meaning and purpose: Meaning involves the use of strengths not for one's self, but to fulfil goals which are perceived to be important. We are at our best when we dedicate time to something greater than ourselves. This could be volunteer work, belonging to a community or a civic or religious group, or learning for a specific goal. These activities have a sense of purpose, a compelling reason why individuals do what they do.

Accomplishment: This signifies leading a productive, meaningful life. This pathway is

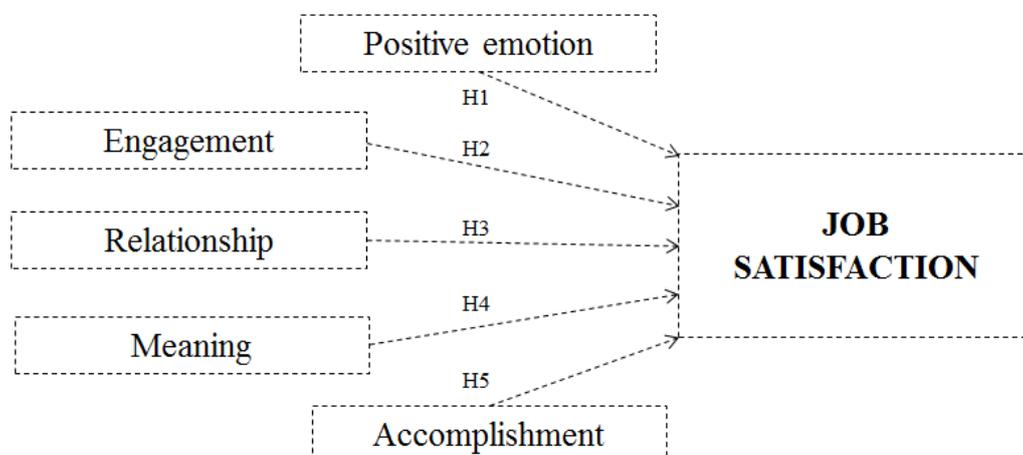
pursued for its own sake, even when it brings no positive emotion, no meaning, and nothing in the way of positive relationships (Seligman 2011, p. 18). Using the PERMA framework as our conceptual basis, we aim to demonstrate that a multidimensional assessment of employees' well-being can provide more specific information to build up a picture of the essential aspects of workplace well-being.

### 2.3 The relationship between PERMA model and job satisfaction

There are many investigators studied relationship between PERMA model and satisfaction and job satisfaction. Also some of the scholars studied positive emotion related with job satisfaction. Engagement related with job as according to Kahn (1990) engagement means to be psychologically as well as physically present when occupying and performing an organizational role. According to Saks (2006) a stronger theoretical rationale for explaining employee engagement can be found in Social Exchange Theory (SET). The theory is among the most influential conceptual paradigms for understanding workplace behavior. Its venerable roots can be traced back to at least the 1920s (Malinowski et al., 1922), bridging such disciplines as anthropology (Firth et al, 1967), social psychology (Gouldner et al., 1960), and sociology (Blau et al., 1964).

Margaret L. Kern, Lea Wat were studied their research in 2014, investigated the effects of a multidimensional measure of educational staff wellbeing on physical health, life satisfaction, job satisfaction, and organizational commitment. They studied PERMA model in the assessing employee wellbeing in schools using a multifaceted approach. (2014, Psychology, 5, 500-513). We argued as below researchers' research factors and questionnaire in our study. Thus, according to the literature review the following hypothesis were generated and drawn in Figure 1.

Figure 1: Conceptual models of factors on job satisfaction



Hypothesis 1: Positive emotion will have a positive impact to get job satisfaction.

Hypothesis 2: Engagement will have a positive impact to get job satisfaction.

Hypothesis 3: Relationship will have a positive impact to get job satisfaction.

Hypothesis 4: Meaning will have a positive impact to get job satisfaction.

Hypothesis 5: Accomplishment will have a positive impact to get job satisfaction.

### **3. Research Methodology**

#### **3.1 Data collection and Questionnaire design**

In this study, Likert scales were easy to use and understand. Zikmund (2003) identified that in some instances, the respondents need to select an appropriate answer from a list of specific answers or multiple choices in the closed-ended questions. Veal and Kumar (2005) presented Likert scales are used to indicate respondents' opinions by measuring their agreement and disagreement levels for each question. Kumar (2005) noted that in general, Likert scales have three, five, seven, or ten points depending on how fine researchers want to measure the intensity of people's opinions. Bass, Cascio and O'Conner (1974) defined that although larger Likert scales make it possible to discriminate opinions more finely, they can also confuse the respondents. In general, seven-point scales are found to reduce inaccuracy, whereas five-point scales restrict choice more (Tak, 2012). Therefore, five-point scales were used in this study.

#### **3.2 Selection of SPSS and SmartPLS software program**

There are many software programs used to process data analysis including Statistical Package for the Social Sciences (SPSS), SmartPLS, SAS, STATPAK or Excel. The most popular program is Statistical Package for the Social Sciences. In this study, SPSS and SmartPLS-3.0 were chosen for their simplicity and completeness. The internal reliability of each factor was assessed using Cronbach's alpha coefficient. This is followed by the examination and presentation of demographic profile of respondents using Descriptive Statistic. The study was conducted to check the consistency of all related factors in the study based on Cronbach's Alpha value.

Firstly, according to Zikmund (2000) descriptive analysis refers to the transformation of the raw data into a form that will make it easy to understand and interpret. Secondly, the Cronbach Alpha testing will be used as it is the most well accepted reliability test tools applied by social researchers (Sekaran, 2003). Cronbach (1946) identified that in Cronbach's Alpha reliability analysis, the closer Cronbach's Alpha to 1.0, the higher the internal consistency reliability. Cronbach's measures:

1. Reliability less than 0.6 considered poor.

2. Reliability in the range 0.7 is considered to be acceptable.
3. Reliability more than 0.8 are considered to be good

Thirdly, in order to determine whether there are significant relationships among the independent variables and dependent variable, Pearson Correlation Coefficient analysis was being carried out. The scale model suggested by Davies (1971) used to describe the relationship between the independent variables and the dependent variable, are as shown that 0.7 and above: very strong relationship, 0.50 to 0.69: strong relationships, 0.30 to 0.49: moderate relationships, 0.10 to 0.29: low relationships, 0.01 to 0.09: very low relationships.

Finally, Multiple Regression Analysis was conducted to examine which among the three dimensions in independent variables was the most important in explaining the relationship (Norizan, 2012). SPSS and SmartPLS were used to test the relationships between variables. After the reliable questionnaires were identified and the data was entered, data analysis began. This section describes the demographic characteristics of the respondents. Of all the 138 respondents were public sectors' staffs, male 56 and female 82.

Table 2: Information of participants

No	Gender	Frequency	Percent
1	Male	56	40.58%
2	Female	82	59.42%
TOTAL		<b>138</b>	<b>100.00%</b>

In this section, the discriminant validity was highly achieved. The analysis shows that six considered latent constructs are all correlated with each. There are most highly correlated with po emr=0.755 and mear=0.631, engar=0.741 and relar=0.538, relar=0.750 and mear=0.576, mear=0.643 and JS r=0.5888 accor=0.600 and JS r=0.666. other (Table 3)

Table 3: Latent Variable Correlations for participants

Items	Po. Em	Enga	Rela	Mea	Accom	JS
Po. Em	<b>0.755</b>					
Enga	<b>0.158</b>	<b>0.741</b>				
Rela	<b>0.486</b>	<b>0.538</b>	<b>0.750</b>			
Mea	<b>0.631</b>	<b>0.371</b>	<b>0.576</b>	<b>0.643</b>		

Accom	<b>0.341</b>	<b>0.201</b>	<b>0.113</b>	<b>0.518</b>	<b>0.600</b>	
<b>JS</b>	<b>0.573</b>	<b>0.147</b>	<b>0.488</b>	<b>0.588</b>	<b>0.348</b>	<b>0.666</b>

Note: po em-position emotion, enga-engagement, rela-relationship, mea-meaning, acco-accomplishment, JS-job satisfaction

In our study, the outer loading of 4 items measuring positive emotion ranged from 0.438 to 0.867, the outer loading of 4 items measuring engagement ranged from 0.428 to 0.896, the outer loading of 4 items measuring relationship ranged from 0.601 to 0.727, the outer loading of 4 items measuring meaning ranged from 0.611 to 0.854, the outer loading of 4 items measuring accomplishment ranged from 0.734 to 0.779, the outer loading of 8 items measuring job satisfaction ranged from 0.491 to 0.770. Data analysis results show that CR is more than 0.675, and AVE of position emotion is 0.360, relationship is 0.444. AVE of job satisfaction is 0.413. AVE of others are more than 0.549. Cronbach's alpha of positive emotion is 0.472, Cronbach's alpha of other items are more than 0.583. Cronbach's alpha of Engagement, Meaning, Accomplishment and job satisfaction are more than 0.7. (Table 4)

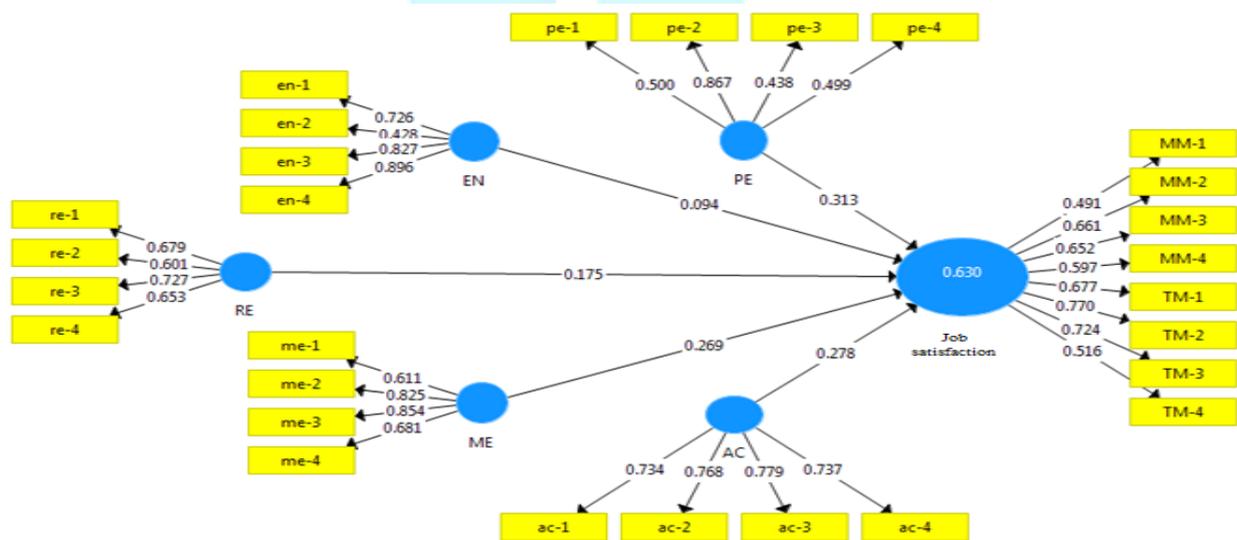
Table 4: List of Items for each Construct of participants

Items	Codes	Factor loading	Cronbach's ALPHA	Rho_A	CR	AVE
Positive emotion	pe-1	0.500	<b>0.472</b>	<b>0.534</b>	<b>0.675</b>	<b>0.360</b>
	pe-2	0.867				
	pe-3	0.438				
	pe-4	0.499				
Engagement	en-1	0.726	<b>0.742</b>	<b>0.908</b>	<b>0.821</b>	<b>0.549</b>
	en-2	0.428				
	en-3	0.827				
	en-4	0.896				
Relationship	re-1	0.679	<b>0.583</b>	<b>0.579</b>	<b>0.761</b>	<b>0.444</b>
	re-2	0.601				
	re-3	0.727				
	re-4	0.653				
Meaning	me-1	0.611	<b>0.745</b>	<b>0.800</b>	<b>0.834</b>	<b>0.562</b>
	me-1	0.825				
	me-1	0.854				
	me-1	0.681				
	ac-1	0.734				

Accomplishment	ac-2	0.768	<b>0.752</b>	<b>0.757</b>	<b>0.841</b>	<b>0.570</b>
	ac-3	0.779				
	ac-4	0.737				
<b>JOB SATISFACTION</b>	mm-1	0.491	<b>0.791</b>	<b>0.805</b>	<b>0.846</b>	<b>0.413</b>
	mm-2	0.661				
	mm-3	0.652				
	mm-4	0.597				
	tm-1	0.677				
	tm-2	0.770				
	tm-3	0.724				
tm-4	0.516					

Note: pe-position emotion, en-engagement, re-relationship, me-meaning, ac-accomplishment, mm-motivation of managerial, tm-motivation of co-workers

Figure 2: Results of Structure Analysis on Public sector in Mongolia (algorithm)



Note: pe-position emotion, en-engagement, re-relationship, me-meaning, ac-accomplishment, mm-motivation of managerial, tm-motivation of co-workers

This analysis explains the description of relationships of the hypothesized model. It tests the proposed structural model and hypothesized relationships between results of structure analysis on public sectors. According to the structure in Figure 2:

- The model suggests that positive emotion (0.313) has effect on job satisfaction (0.630).
- The model suggests that engagement (0.094) has effect on job satisfaction (0.630).
- The model suggests that relationship (0.175) has effect on job satisfaction (0.630).
- The model suggests that meaning (0.269) has effect on job satisfaction (0.630).

- The model suggests that accomplishment (0.278) has effect on job satisfaction (0.630).

In our study, H-1, H-4, H-5 were significantly supported in public sector. For instance, positive emotion positively relates on job satisfaction (H1,  $\beta=0.318$ ,  $t=2.945$ ,  $p<0.003$ ), meaning positively relates on job satisfaction (H4,  $\beta=0.243$ ,  $t=2.034$ ,  $p<0.042$ ) and accomplishment positively relates on job satisfaction (H5,  $\beta=0.292$ ,  $t=2.345$ ,  $p<0.019$ ) (Table 4)

Table5: Path Coefficients for public sector in Mongolia

Hypo-thesis	Path	Regression weight	Standard error	T statistics	P value	Result
H-1	Pe→JS	0.318	0.106	2.945	0.003	Supported
H-2	En→JS	0.120	0.126	0.744	0.457	Non-supported
H-3	Re→JS	0.180	0.127	1.377	0.169	Non-supported
H-4	Me→JS	0.243	0.132	2.034	0.042	Supported
H-5	Ac→JS	0.292	0.119	2.345	0.019	Supported

Note: pe-positive emotion, en-engagement, re-relationship, me-meaning, ac-accomplishment, JS- job satisfaction.

#### 4. Conclusion

The findings of our study showed that three impacts positive emotion, meaning and accomplishment have a positive relationship with job satisfaction in public sector in Mongolia. The scope of this study involves only the public sector in Mongolia. Due to time limitation, it is recommended that future survey could be expanded to remote areas isolated areas draw the results regarding PERMA model's five following elements: positive emotion, engagement, relationships, meaning and accomplishment. Finally, the results from the study may help the essential features of supervisors in detecting the things that need to be improved in the organization in order to improve of positive emotion, engagement, relationships, meaning and accomplishment on job satisfaction.

We recommend that public sector can be surveyed every fiscal year to determine innovative ways to capture the essence of the public officers in public sector of Mongolia. Based on the results of this study, the following recommendations are made in public sector for the effects of five elements on job satisfaction. Therefore, future research, practices and policies will make effort in presenting the recommendations. This study did not include any religion, living area, prior military service or ethnicity. However, future research could try to include these variables to draw on other similar investigators' study results in regard to specific sample populations of the public sector in Mongolia. Due to time limitation, it is

recommended that future survey could be expanded to remote areas isolated areas draw the results regarding five elements on job satisfaction.

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## The Antecedents of Consumer's Green Purchase and Eating

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### Abstract

Consumers' consumption of goods and services has increased significantly in the past decades, leading to depletion of natural resources and serious damage of the environment. Some of the serious consequences of environmental damage and deterioration are the increases of global warming, climate change, environmental pollution and the decreases of the diversity and the number of animals and plants. Consumers begin to consider taking the responsibility to purchase and use various environmentally friendly green products to reduce or avoid negative environmental and social impacts, called as "green purchase". However, why a positive consumer attitude or environmental concerns fail to successfully explain or predict people's green purchase behavior. A lack of a comprehensive investigation of the wide-range of factors results in the knowledge of factors influence on consumer's green purchase behavior remains limited. This study aims to explain the impacts of values, ecological worldviews, environmental concerns, and the perceived psychological distance of climate change, on consumer's green purchase and eating including to buy environmentally-friendly products, to buy products with less packaging, to eat organic or locally-grown or in season. This study conducted an online survey in Taiwan and a total of 409 data was collected for analysis. The results of structural equations modeling indicated that a person's values have positive effect on ecological worldviews, which further affecting perceived psychological distance of climate change and environmental concerns about the negative consequences of climate change. In addition, a person's perceived psychological distance of climate change not only has positive effects on environmental concerns but also has positive effects on green purchase and eating. Finally, a person's environmental concerns have positive effects on green purchase and eating. This study's findings contribute to enhance knowledge of factors influence on consumer's green purchase and eating.

**Keywords:** organic farming, vermicompost, quality, mustard

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- *This research presented on 28th International Conference on Business, Education, Social Science, Management (BESM-28): Seoul/South Korea, Jun. 18<sup>th</sup>-19<sup>th</sup>, 2019*
- *Required by the authors, the full article is not publicly available so far due to commercial/academic confidentiality*



## **Preference of Second Language as a Medium of Instruction for Undergraduates of Public Universities in Sri Lanka**

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### **Abstract**

English medium instruction has been introduced in public universities in Sri Lanka with the intention of making graduates readily employable in the private sector as the business language in the country is English. Students who enter universities find it difficult to manage their studies in the medium of English as majority of them have had their secondary education in their mother tongue. Though medium of instruction was in English language long time ago, later it has being changed to Sinhala and Tamil language as a national policy. It made recent generations to study their secondary education in their mother tongue. Since market demands for English, there was a huge necessity to conduct in English medium in universities. It resulted in reverting back to English medium as a medium of instruction in public universities. Although there are some studies around the world within this field, there are lack of studies in tertiary education in Sri Lankan context. The objective of the study was to analyze the preference of second language (English) as a medium of instruction among undergraduates of public universities in Sri Lanka.

Mixed method was used to collect data from undergraduates. Quantitative analysis was based on surveyed data. The study surveyed the undergraduates of Management stream in public universities in Sri Lanka. Primary data were collected using a semi structured questionnaire. Qualitative analysis were used to triangulate the quantitative findings.

Majority of the students were supportive of English medium instruction and a considerable percentage of them suggested bilingual teaching during the first and second years enabling them improve their language abilities. A small minority suggested reverting back to mother tongue in instruction. On the other hand, the study found that a small percentage of students were against bilingual teaching as they emphasized listening to English would contribute towards improvement of their language skills. These findings can be utilized in improving the teaching and learning process resulting in producing an employable graduate in Sri Lanka.

**Keywords:** Bilingual teaching, Employability of graduates, English Language, Medium of Instruction, Teaching – learning process

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## **Threat Perception of Thai Government towards Migrant Workers from Myanmar and Rohingya**

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### **Abstract**

The main purpose of this article is to study a perception of Thai government towards migrants' workers from Myanmar and Rohingya. The perception towards these two group of people as observed, is quite similar. This happens because of the fact that the government perceives these peoples with fear and suspicion which doesn't only rooted from its large amount of numbers in a country but also from other factors that shape the perception toward these people into what we call "threat perception". To study why government fears and distrusts these people, the researcher uses the concept of David Singer' perception of threat and threat indicator of Myron Weiner as a research framework. The study finds that those significant factors contributing Thai government to perceive migrant workers from Myanmar as well as Rohingya as "threat" include with 1) Present situation 2) Historical experience 3) Cultural difference 4) Behavior of migrant workers and 5) Leaders' anxiety. Although, government's perceiving these two group of people as threat, both of them pose different level of being threat to the Thai state's security.

**Keywords:** Rohingya, migrant workers, fear, threat perception

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- *This research presented on 28th International Conference on Business, Education, Social Science, Management (BESM-28): Seoul/South Korea, Jun. 18<sup>th</sup>-19<sup>th</sup>, 2019*
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**Part Two:**

**Topic on Engineering, Technology and Applied  
Science**

Editor by Dr. Hanmin Jung  
South Korea University



## Comparing the Quality of Organically Grown Mustard Phak-Coi Using Three Different Types of Vermicompost at Various Rates With Those Inorganically Grown

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### Abstract

Agricultural products, especially organically produced vegetables, are believed to be of better quality compared to inorganic system using agrochemical inputs. There are many kinds of organic fertilizer which used in organic farming. However, the quality of organic fertilizers and their effect on the plant depend on the raw material. A field experiment was undertaken to test the quality of organically grown mustard Phak-coi using three kinds of vermicomposts at various rates compared to those inorganically grown for two sequential planting periods of mustard Phak-Coi in silty clay Inceptisol. The experiment used a randomized block design with two factors. Factor I comprised three kinds of vermicompost with three types of bedding materials; v1-spent mushroom waste, v2-coconut husk, and v3-sugarcane trash, while factor II comprised four different application rates: 5, 10, 15, and 20 t ha<sup>-1</sup>. From these two factors, there were 12 treatments plus one control treatment (using an application of NPK fertilizer). The application of three types of vermicompost improved the quality of the mustard as measured by Total Dissolved Solids, Sugar, Vitamin C, Vitamin A, Phenolic compound and Ca content with the average quality increase of 10 % compared to the control for two sequential planting periods of mustard Phak-coi. The highest quality increase was found in the vermicompos treatment using bedding of coconut husk (v2) with an average of 10.5 % compared to the control. While the highest quality mustard was found in the lowest rate (5 ton ha<sup>-1</sup>).

**Keywords:** organic farming, vermicompost, quality, mustard

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➤ *This research presented on 27th International Conference on Engineering, Technology and Applied Science (ETAS-27): Seoul/South Korea, Jun. 18<sup>th</sup>-19<sup>th</sup>, 2019*

## 1. Introduction

Recently, organic farming has begun to develop in the modern world, with increasing public awareness of healthy food products. This is in response to conventional farming systems that implement intensive monoculture systems using high-dose synthetic fertilizers, chemical pesticides and heavy machinery. The agricultural practices result in environmental degradation and on the other hand overproduction of food, which in turn decreases the quality of agricultural products characterized by the low nutritional content of food products. Nowadays, the world community wants healthy agricultural products that support sustainable human health (Rembiałkowska et al., 2012)

Mustard Phak-coy is one of vegetables Brassica crops. The plant within the family Brassicaceae constitutes one of the world's most economically important plant groups. In general, vegetable Brassica crops are very nutritive, providing nutrients, mineral and phytochemicals such as phenolic compounds, vitamin (Dekker et al., 2000; Vallejo et al., 2002, 2003, 2004; Heimler et al., 2001), glucosinolates (Fowke et al., 2003), fat and carotenoids (Zakaria-Rungkat et al., 2000). The Brassica crops have a higher content of vitamins compared to 30 other vegetable crops (e.g., artichoke, bean beet, carrot, sweet corn, onion, lettuce or spinach). They have the highest level of vitamin C and also have high levels of vitamin B-6 (exceeded by garlic, pepper and spinach), vitamin A and  $\beta$ -carotene (only exceeded by carrot), lutein, zeaxanthin and vitamin K. Vitamin C, E and carotenoids have the potential to prevent and treat malignant and degenerative diseases (Jahangir et al., 2009). Brassica crops have been found to be rich in many minerals. They have high levels of calcium, being higher than most of the compared vegetable crops, so a good source of calcium (Lucarini et al., 1999)

The nutritional content of vegetables can be improved by implementing organic farming systems (Matt et al., 2011). Organic farming practices are considered as environment friendly, mainly due to the reduction of agrochemical and the implementation of a fundamental principle of harmonious cooperation with nature. Organic farming system improves the condition of the environment, soil and groundwater (Haas et al., 2000) which in turn enhances crop quality. There are various kinds of organic fertilizers used in organic farming systems. One of them is vermicompost. Vermicompost is a high-quality organic fertilizer. The results of the study proved that the application of vermicompost increases the growth and yield of various types of plants (Lazcano and Dominguez, 2011). The vermicompost contained higher macronutrient and micronutrient than the traditional compost produced from the same raw material (Bhat and Limaye, 2012; Morales-Corts et al., 2014; Lakshmi et al., 2013; Pattnaik and Reddy, 2010). Vermicompost positively impacted on physicochemical and biological properties of soil (Parthasarathi et al., 2008; Lim et al., 2015). It also contains plant

growth regulator or humic acid, which were also responsible for improving plant growth (Arancon et al., 2008). However, the quality of vermicompost depends upon the characteristics of the raw material (Nouri et al., 2012; Nurhidayati et al., 2017a).

Application of vermicompost also improved crop quality. The results of some research showed that the application of vermicompost increased the vitamin C content of tomatoes (Song et al., 2015). The content of mineral nutrients, total carotenoids, antioxidant activity, and total phenolics of phak-coi mustard were higher under vermicompost application compared with synthetic fertilisation (Pant et al., 2009). Total chlorophyll concentration of lettuce was increased in the vermicompost treatments compared with the control (inorganic fertilisation) (Papathanasiou, 2012). Vermicomposts had a positive effect on the soil biological properties and rice quality (Tejada and Gonales, 2009), crop yield and quality of sweet corn (Lazcano et al., 2011) as well as Brassica crops such as broccoli, cabbage and mustard (Nurhidayati et al., 2015; Nurhidayati et al., 2016; Nurhidayati et al., 2017b).

We hypothesise that vermicompost with different raw materials and application rates will independently and interactively affect nutritive quality of mustard Phak-coi. Therefore, the objectives of this study were to evaluate the effects of adding three kinds of vermicomposts with different bedding and application rates on quality of mustards Phak-coi on two periods of planting compared with inorganic fertilisation.

## **2. Materials and Methods**

### **2.1 Study site and soil characteristics**

This study was a field experiment conducted at Landungsari village, Dau district, Malang regency in March–July 2017 with an altitude of 544 m above sea level, 07°55'42.1"S latitude, and 112°35'55.0"E longitude. The average temperature was 22–28 °C while the rainfall is 1750 mm/year. The field had a semi-technical irrigation system. The type of soil was an Inceptisol. The soil characteristic was silty clay comprising 46% clay, 46% silt, and 8% sand. The soil had bulk density of 1.23 g cm<sup>-3</sup>. The soil was low in organic carbon (0.96%), with pH 5.7, low in total N (0.15%), high in phosphorus (228.26 mg kg<sup>-1</sup>), and low in available K (0.33 cmol kg<sup>-1</sup> soil).

### **2.2 Preparation of vermicompost and experiment design**

The study was undertaken to determine the potential of three types of vermicompost as organic fertilizer to increase the quality of mustard. The vermicompost materials consisted of bedding (spent mushrooms waste, coconut husk and sugarcane trash) cow dung, leaves litter and vegetable wastes. There were three kinds of vermicompost with different bedding which used in this study namely (v1) spent mushroom waste, (v2) coconut husk and (v3)

sugarcane trash.

The materials were collected from traditional market, around the campus of the University of Islam Malang, farmland, cattle farm and agroindustry of oyster mushrooms. The bedding material was placed at the bottom and top of the vermicomposting bin having a size of 80 × 120 × 30 cm. A mixture of cow dung, vegetables residue and leaves litter were placed at the middle. The materials were feed of earthworm. The amount of material needed to fill the bin was 40 kg of bedding materials and 20 kg of worm feed. This amount was adapted to the capacity of the worm to decompose organic matter on a daily basis. Vermicomposting process lasted for 28 days using the earthworm species, *Lumbricus rubellus*. Thereafter, composting was done for 14 days.

The moisture content of 80% was maintained during vermicomposting. The vermicomposting bins were covered with black cloth to avoid the sunlight. The duration of vermicomposting was four weeks and two weeks for composting. In addition, we used flour of eggs shells and fish meal as additives materials derived from the waste of broiler breeding industry and fishing industry. The chemical compositions of the resulting vermicomposts were analyzed (Table 1). This experiment used a factorial randomized block design (RBD) which consisted of two factors. The first factor comprised three kinds of vermicompost (V) with three different bedding materials as explained before. The second factor comprised four different rates of vermicompost application: D1 = 5 t ha<sup>-1</sup>, D2 = 10 t ha<sup>-1</sup>, D3 = 15 t ha<sup>-1</sup>, and D4 = 20 t ha<sup>-1</sup>. From these two factors, there were 12 treatment combinations plus one control treatment (using an application of NPK fertilizer). Each treatment was replicated three times to obtain 39 units of experimental plot, and each experimental plot had five samples of the observed plants.

Tabel 1. Chemical composition of three kinds of vermicompost on dry weight basis

No.	Chemical properties	V1	V2	V3
1	C-organic (%)	17.39	34,66	19,09
2	Polyphenol (%)	0.79	0,67	1,58
3	Celulose (%)	26.75	27,86	27,34
4	Lignin (%)	25.08	24,15	15,8
5	Total N (%)	2.04	2,28	2,22
6	C:N ratio	8.52	15,22	8,60
7	P (%)	10.63	0,73	8,08

8	K (%)	0,23	1,05	0.52
9	pH	7,4	7,2	7,1
10.	Ash (%)	4,66	4,73	3,86

### 2.3 Experimental procedures

Phak-coi mustard seeds were planted in the medium mixture of cow dung and soil with a ratio of 1:1. This seedling takes 3 weeks (21 days) to be ready for transplanting. Land preparation was done by tilling the soil with a hoe and then making a bed of 2.5 m × 1.5 m. All experimental plots received the application of cow dung with a rate of 5 t ha<sup>-1</sup>. Three kinds of vermicompost were weighed in accordance with the application rate. Then, the vermicompost was incorporated into the well-prepared beds evenly using the hoe 1 week before planting. Mustard seedlings were planted at a spacing of 20 cm × 20 cm, 21 days after seeding and a week after vermicompost application. Watering and manual weeding was done. The mustard was harvested 28 days after transplanting. After harvesting the first crop of mustard, the land was cleared for 1 week and planting the second crop of mustard. The observed variables were total dissolved solids, total sugar content, vitamin C content, vitamin A content, Calcium content, and phenolic compound content.

The total dissolved solids and total sugar content of the crop yield was measured using digital refractometer method (Jackson, 1973). Vitamin C content was measured by iodometric titration method. The vitamin A content was measured by high-performance liquid chromatography method. Calcium content was measured by Atomic Absorption Spectrophotometer method. The phenolic compound content was measured by Folin-Denis method (Anderson and Ingram ,1993).

### 2.4 Statistical analysis

The collected data were statistically confirmed using analysis of variance (*F* Test) at  $P \leq 0.05$  and the differences between each treatment were determined by Tukey test ( $P \leq 0.05$ ) using Minitab Version 14.12. Dunnett's test at 5% level was used to compare all treatments with control. For statistical analysis of data, Microsoft Excel was used.

## 3. Result and Discussion

### 3.1 Effect of various vermicompost with different rates on the total dissolved solids and total sugar content.

The three types of vermicompost did not significantly affected the total dissolved solids for the first mustard, but significantly affected for the second mustard. This treatment

significantly affected the total sugar content for the first and the second mustard. Overall, the first mustard had higher total dissolved solids and sugar content than the second mustard. The treatment of vermicompost v2 (coconut husk) and v3 (sugarcane trash) gave the highest total dissolved solids and total sugar content with application rates of 5-15 ton ha<sup>-1</sup> for the first mustard. For the second mustard, the highest total dissolved solids and total sugar content were found at the v2 treatment with the application rate of 5 ton ha<sup>-1</sup> (Fig.1).

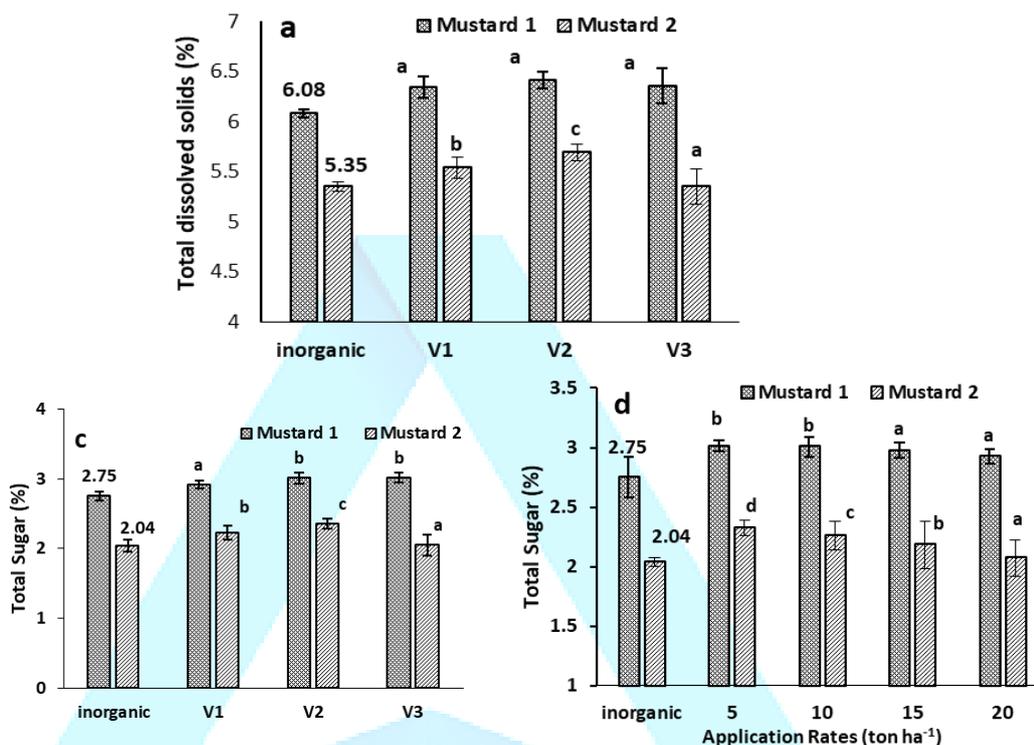


Figure 1. The total dissolved solids and total sugar content (a-d) due to the kind of vermicompost and application rates for the first and the second mustards compared to the inorganic treatment. (remarks: V1, V2, and V3 = kind of vermicompost; charts followed by different letters in the same mustard are statistically significant different at Tukey test, P = 0.05).

Based on Dunnett test (P=0,05), the first and second mustards with those organically grown using vermicompost significantly had the higher total dissolved solids and total sugar content than those inorganically grown. The increase in the total dissolved solids content for the first and second mustards were 5.2 % and 3.5% respectively, while the increase in the total sugar content by 8.1 % and 8.2 %. It is due to the better role of nutrients which is involved in the carbohydrate synthesis, breakdown and translocation of starch, synthesis of protein and neutralization of physiologically important organic acids (Vanilarasu and Balakrishnamurthy, 2014).

The total dissolved solid and sugar content of crops were affected by endogenous factors and environmental factors such as cultivation practices and climatic conditions during plant development (Beckles, 2012; Hartl, 2011). The most important environmental factors were

water availability, soil mineral content, irrigation and fertilization regime (Dorais et al., 2008). Nitrogen, phosphorus and potassium are critical for crop yield and also affect the total dissolved solid and total sugar content. The timing and method of mineral application, chemical form of the minerals applied, and crop genotype affect the response to varying mineral concentrations on the total dissolved solid (Benard et al., 2009; Chapagain et al., 2003; Sainju et al., 2003; Varis and George, 1985).

The treatment v2 (cocconut husk) had higher potassium content than the other vermicompost. It can significantly affect the total dissolved solid and total sugar content. The higher soil potassium levels, the higher the total dissolved solid and total sugar in a plant (Benard et al., 2009; Sainju et al., 2003; Wang et al., 2009; Weston and Barth, 1997). Heeb et al. (2005) found that organic sources of nitrogen and ammonium were more synchronous with plant nutrient requirements than inorganic nitrate and can promote higher soluble solids (Barrett et al., 2007; Chassy et al., 2006; Pieper and Barrett, 2009). This study result in line with the research result of Riahi et al. (2009) which stated that some organic substrates promoted higher the total dissolved solid.

### **3.2 Effect of various vermicompost with different rates on the vitamin C and A content.**

The effect of three types of vermicompost on vitamin C and A content is presented in Figure 2. All types of vermicompost increased vitamin C and A content significantly compared with the inorganic fertilizer for the first and second mustard. The average increase in the vitamin C content for the first and second mustards were 9.5 % and 13.1%, respectively, while the average increase in the vitamin A content by 12.0 % and 14.4 %. Asami et al., (2003) stated that the higher levels of ascorbic acid content were consistently found in organically and sustainably grown foods as compared to those produced by conventional agricultural practices using chemical fertilizer. Pant et al. (2009) reported that vermicompost fertiliser treated plants had 72% higher carotenoid content than control plants using in organic fertilizer.

However, there was no significant difference in vitamin C content among three types of vermicompost for the second mustard and among four application rates on the vitamin A and C content of the first mustard. Song et al. (2015) found the effects of plant growth regulators produced by microorganisms during vermicomposting improved crop quality significantly as compared to chemical fertilizer independent of the amount of nutrient input to some extent.

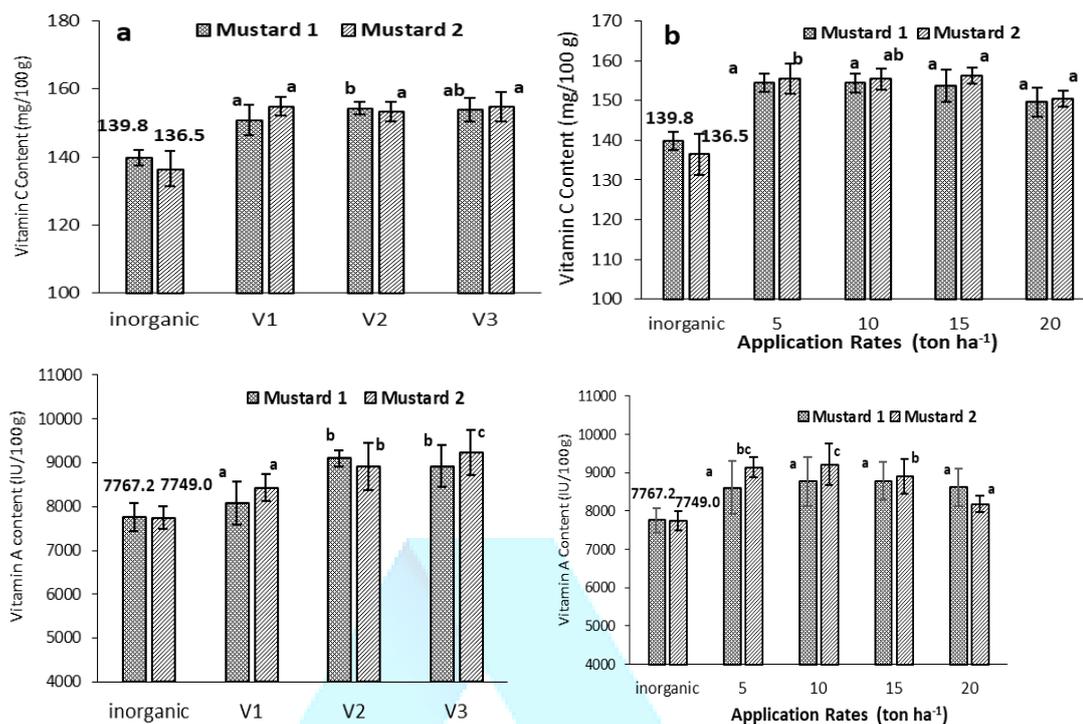


Figure 2. The vitamin C and A content (a–d) due to the kind of vermicompost and application rates for the first and the second mustards compared to the inorganic treatment. (remarks: V1, V2, and V3 = kind of vermicompost; charts followed by different letters in the same mustard are statistically significant different at Tukey test,  $P = 0.05$ ).

The treatments of vermicompost v1 (spent mushroom waste) and v3 (sugarcane trash) had higher vitamin C and A content for the second mustard than the first mustard. The application rates had the highest vitamin C and A content was 5-10  $\text{ton ha}^{-1}$  (Fig.2). The vermicompost v1 and v3 had lower total N content than v3. The condition can affect the nitrate accumulation in the plant. The lower nitrate accumulation in the vermicompost-treated plants could be explained by the tendency of the vermicompost-amended soils to retain more available N due to the presence of more organic matter and high concentration in humic substances. Similarly, lower increase in plant nitrate concentration has been reported, when using organic fertilization compared to the inorganic fertilization (Pavlou et al., 2007). This study showed that vermicompost containing high N was not able to increase the vitamin C content of Phak-coi mustard. This result is in line with the study of Papathanasiou et al. (2012) who reported that high nitrate content in plants is not always followed by high vitamin C content.

### 3.3 Effect of various vermicompost with different rates on the phenolic compound content

The phenolic compound content was significantly affected by the vermicompost

addition to the cultivation soil for the first and second mustard. Overall, the second mustard had higher phenolic compound content than the first mustard (Fig.3). This is probably caused by a decrease in the release of N from vermicompost which stimulates the formation of secondary metabolites such as phenolic compound. An increased concentration of total phenolics was associated with low mineral N concentration in plant tissue. A higher level of total phenolics was observed in plants grown under vermicompost fertilisation than in those grown under inorganic fertilisation. This could be due to a more rapid release of plant-available nutrients from inorganic fertilizer compared with vermicompost (Pant et al., 2009). It also has been demonstrated previously that stress, particularly low N, can induce greater concentrations of phenolics in plant tissue (Brown et al., 1984; Estiarte et al. 1994). Nutrient stresses can reduce growth more than photosynthesis. The excess C relative to nutrients will be allocated to C-based defensive compounds, including phenolics (Tuomi et al., 1988).

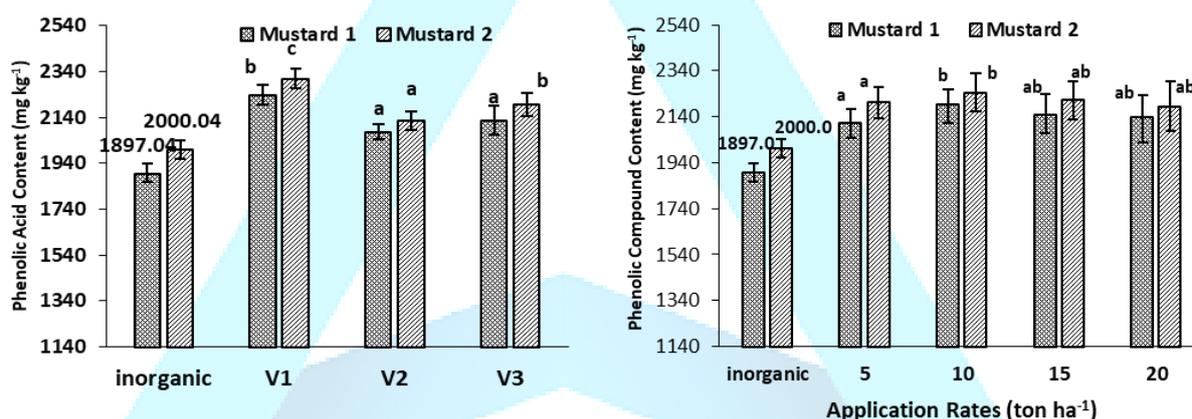


Figure 3. The phenolic compound content (a–d) due to the kind of vermicompost and application rates for the first and the second mustards compared to the inorganic treatment. (remarks: V1, V2, and V3 = kind of vermicompost; charts followed by different letters in the same mustard are statistically significant different at Tukey test,  $P = 0.05$ ).

The treatment of vermicompost v1 (spent mushroom waste) gave the highest phenolic compound content with application rates of 10–20  $\text{ton ha}^{-1}$  for the first and second mustard (Fig.3). The vermicompost v1 had lower N total than vermicompos v2 and v3. It can stimulate the formation of secondary metabolite compounds in plant tissue. Addition to production of phenolic compounds in the plant tissue is also influenced by environmental factor such as light, temperature, soil water, soil nutrients and salinity (Rezende et al., 2015; Yang et al., 2018). Ibrahim et al. (2010) reported that nitrogen levels had a significant impact on the production of total phenolics and flavonoids in *Labisia pumila* Benth. In the

leaves of tomato (*Lycopersicon esculentum*) with N-deficient rhizosphere condition, anthocyanins and one of flavonols consistently increased by 2- to 3-fold, while total non-anthocyanin flavonoids increased by 14% only, comparable to wild type plants (Bongue-Bartelsman et al., 1995). A large number of experiments have been proposed that nutrient deficiencies of plants is characterized by an accumulation of flavonoids, notably the anthocyanins. The inverse relationship between the availability of both nitrogen and phosphate availability and the content of flavonol in *Arabidopsis* (Stewart et al., 2001)

The first and second mustards with those organically grown using vermicompost had the higher phenolic compound content than those inorganically grown. The average increase in the phenolic compound content for the first and second mustards were 13.2 % and 10.5 %, respectively. Asami et al. (2003) also stated that the higher levels of total phenolic compound content were consistently found in organically and sustainably grown foods as compared to those produced by conventional agricultural practices. Antioxidant activity and total phenolics were higher under organic compared with synthetic fertilisation (Pant et al., 2009)

#### **4. Conclusion**

The treatments using vermicompost provided higher quality of mustard yield than inorganic treatments for two sequential planting periods of mustard. The first mustard plant had a higher total dissolved solid and total sugar than the second one. However, it had lower vitamin C and A and phenolic compound content than the second one. The three vermicompost gave different effect on the tested quality parameter. Overall, the application rates provided the best quality mustard for two sequential planting periods of mustard was 5 tons ha<sup>-1</sup> with an average quality increase of 10 % compared to the inorganic fertilizer. Based on this research results, application of vermicompost in organic farming is needed to produce mustard which has high nutrition. Differences of quality between organically and inorganically grown vegetables allows for the possibility that organically grown vegetables may benefit human health better than corresponding inorganically grown plant.

#### **5. Acknowledgements**

The authors would like to thank Directorate of Higher Education, Ministry of Research and Technology and High Education, Indonesia for their financial support through the research grant scheme of the University Excellent Research 2017 and the grant of overseas seminar assistance from Directorate General of Research Strengthening and Development, Ministry of Research, Technology and High Education, Indonesia.

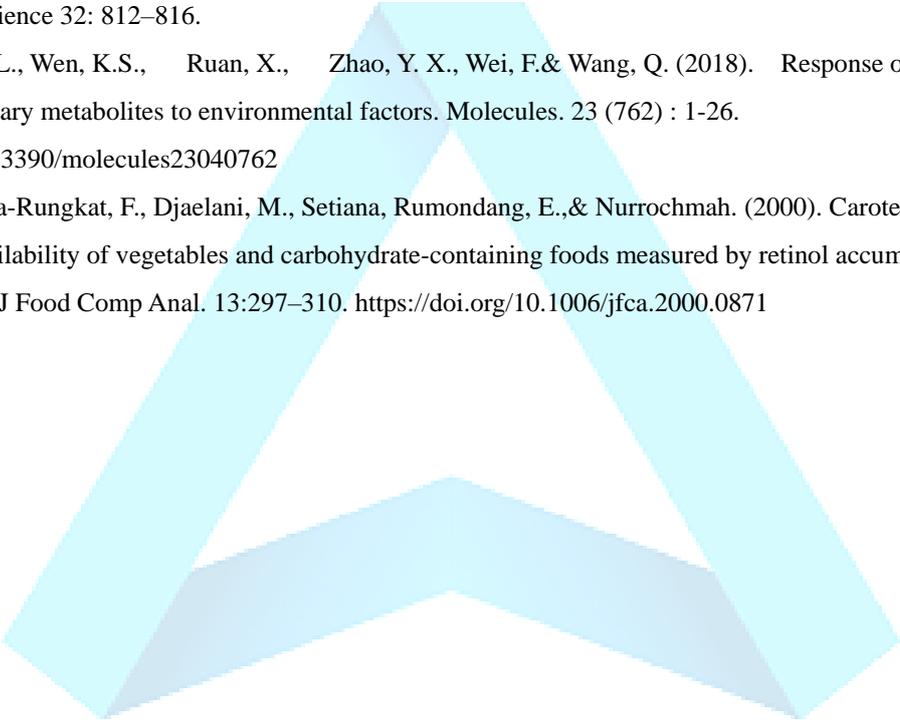
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- BESM 28& ETAS 27 /2019.06.18-06.19
- Organized by: AASE
- Published by: ETAS/BEAM Press

