

# The Role of Cognitive and Non-Cognitive Skills on Labour Market Outcomes in Indonesia

*(Peranan Kemahiran Kognitif dan Bukan Kognitif terhadap Hasil Pasaran Buruh di Indonesia)*

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## ABSTRACT

*This study aims to examine the influence of cognitive and non-cognitive skills on labour market outcomes in Indonesia. The research employs the modified Mincerian model that considers the role of cognitive and personality traits of non-cognitive capacities on earnings. This study relies on the data of the fifth wave Indonesian Family Life Survey (IFLS) using sample of 8,810 individuals. The IFLS was conducted in Indonesia in 2014. The research data use cross section data covering 13 provinces in Indonesia. The results show that cognitive capacities measured by schooling and non-cognitive aspects of personality traits determine the labour market outcomes. Attending higher degree of education explains higher performance of labour. In addition, extraversion personality is a strong predictor of workers' performance particularly for upper income groups. Furthermore, the contributions of marital status and personality traits are varied between male and female workers. Labour market and education policies should consider the development of both cognitive and non-cognitive skills to improve labour market outcomes.*

*Keywords: Wages; labour market; cognitive and non-cognitive skills; big five personality traits; Mincer equation*

## ABSTRAK

*Kajian ini bertujuan untuk mengkaji pengaruh kemahiran kognitif dan bukan kognitif terhadap hasil pasaran buruh di Indonesia. Penyelidikan ini menggunakan model Mincerian yang diubahsuai dengan mengambilkira peranan bagi ciri-ciri kognitif dan keupayaan personaliti bukan kognitif ke atas pendapatan. Kajian ini bergantung kepada data gelombang kelima Indonesian Family Life Survey (IFLS) yang menggunakan 8,810 sampel individu. IFLS telah dijalankan di Indonesia pada tahun 2014. Data penyelidikan adalah menggunakan data keratan rentas yang meliputi 13 wilayah di Indonesia. Hasil kajian menunjukkan bahawa keupayaan kognitif diukur berdasarkan persekolahan dan aspek ciri-ciri personaliti bukan kognitif menentukan hasil pasaran buruh. Semakin tinggi tahap pendidikan menunjukkan semakin tinggi prestasi kerja buruh. Di samping itu, personaliti ekstraversi merupakan peramal kuat bagi prestasi buruh terutamanya untuk golongan berpendapatan tinggi. Selain itu, status perkhawinan dan ciri-ciri personaliti yang pelbagai antara buruh lelaki dan wanita turut memberi sumbangan. Pasaran buruh dan polisi pendidikan harus mempertimbangkan pembangunan kemahiran kognitif dan bukan kognitif untuk meningkatkan hasil pasaran buruh.*

*Kata kunci: Upah; pasaran buruh; kemahiran kognitif dan bukan kognitif; lima ciri-ciri keperibadian yang besar; persamaan Mincer*

## INTRODUCTION

As widely discussed in economic literature on human capital, individuals have different characteristics and capacities which in turn have a role in determining labour market outcomes (Mankiw 2010; Todaro & Smith 2011). Particularly, the previous studies in human capital study acknowledged the importance of cognitive ability in determining the labour market outcomes. Plenty empirical studies have confirmed the positive effect of

cognitive ability on wages (Becker 1993) and economic growth (Hanushek 2013).

Early studies discussing the importance of cognitive capacities in determining economic status were presented in the psychology and sociology literatures. A prominent literature by Herrnstein and Murray (1994) known as the "g" theory of human behaviour emphasized the importance of cognitive capacities measured by Intelligence Quotient (IQ). They argued that cognitive ability was the best predictor of workers' productivity.

This proposition was supported by Jensen (1998) that cognitive capacities were the main elements of socio-economic outcomes.

Meanwhile, other studies - for example, Wolfe and Johnson (1995) and Duckworth and Seligman (2012) - argued that non-cognitive skills have an important role in enhancing schooling performance for both children and adults. In the area of economics, Bowles and Gintis (2002) and Edwards (1975) suggested that non-cognitive skills - such as obedience, loyalty and persistence - were perceived as more important than the cognitive ability particularly for low skill labour market.

Moreover, current empirical studies showed that both cognitive and non-cognitive skills were capable of predicting the outcome of labour market. The study conducted by Heckman and Urzua (2006), for instance, found that both capacities were able to explain labour market outcomes and social behaviour. In addition, a study by Heckman and Kautz (2012) also explained the role of non-cognitive skills on wages in the labour market.

According to Ham et al. (2009), the individual characteristics are distinctive. Moreover, Silitonga (2009) described that individual characteristics was affected by the intrinsic factors and experiences in the past and present. Every individual has their own means and capacities to develop their characters. In other words, their distinct characteristics will be developed by their distinct capacities and skills that influence the labour market accordingly (Meier & Schiopu 2015).

Some studies also found that characteristics influence the choices of jobs and careers pursued by each individual (Ham et al. 2009). A study by Furnham (2005) stated that personality influenced individual behaviour in the organization, company and society. Heckman and Urzua (2006) also perceived the role of non-cognitive capacities in increasing wages and workers' productivity directly. Furthermore, the jobs and behaviour have significant contribution of workers' wages. Some studies in economics and psychology suggested that cognitive and non-cognitive capacities are the strong predictors of economy and social outcomes.

Non-cognitive capacities - such as, character, motivation, health, and strength - influenced socio-economic achievement of an individual. Moreover, Mueller and Plug (2006) showed that the influence of individuals' non-cognitive characteristics on wages are as strong as the influence of cognitive skills. Similarly, a study by Cobb-Clark and Schurer (2011) argued that characteristics is an important element of non-cognitive capacities that highly related to workers' income. Finally, Cubel et al. (2016) underlined the importance of character as a relevant measure of non-cognitive capacities and its contribution in determining wages. According to Cubel et al., individual's character is a combination of emotional characteristics, attitudes and behaviour that are distinctive for every individual. The suitability between character and type of works contributes to workers' productivity

and their jobs satisfaction. Thus, individual character has an important role in understanding the workers' behaviour in the institution.

Therefore, economist has broadened the measure of workers' capacities into both cognitive and non-cognitive skills. In order to understand the individuals' non-cognitive capacities, economist relies on psychology literature in which individual characteristics are determined by using the psychometric tools (Duckworth et al. 2008). The frequently used psychometric tools to understand the types of characteristics of an individual is the Big Five Personality Factors. Another term used to represent the model is the Five Factor Model (FFM). This concept has been used by a large number of studies in examining the organizational behaviour that is linked to individual performance. A particular dimension of individuals' characteristics has a significant and consistent influence on his/her performance with regard to works or learning process (Heckman & Urzua 2006).

This study aims to investigate the role of human capital on labour market outcome using the Indonesian workers' data. It is expected to contribute to the literature by measuring human capital using both cognitive and non-cognitive capacities. The previous studies particularly in the case of Asian countries, such as Indonesia only focused on the importance of cognitive capacities and the years of schooling on the labour market performance (Purnastuti et al. 2013; Suryadarma & Suryahadi 2010). Thus, this study is aimed at contributing to the discussion on the impact of education on human capital by capturing the relationship between both cognitive and non-cognitive skills and labour market outcome with a particular reference to developing countries that are currently experiencing an increase in educated unemployment.

The education level of Indonesian workers rises as shown by the decreased number of workers with basic education and a rising proportion of workers with tertiary education. Meanwhile, the quality of education is perceived to be low when compared with international standards. In terms of cognitive capacities, Indonesian students' score of PISA (Program for International Student Assessment) was ranked 62 out of 70 countries in reading, math and science subjects. Moreover, the skill mismatch has taken place in Indonesia labour market, which has been acknowledged by Indonesia's Minister of Labour in his article published in *Kompas*, 19 May 2018. The Minister claimed that despite an increased number of higher educated labour, the majority of firms have experienced a difficulty in recruiting suitable candidates to fill jobs which require soft skills, English proficiency and computer literacy.

Soft skills could be defined as an ability to deal with people with a positive attitude. Soft skills include social skills, high-order thinking skills, communication skill, self-control and positive self-concept (Lippman et al. 2015). They found that personal qualities such as self-control and positive attitude enable people to master

soft skills that enable them to work collaboratively, perform well and achieve their goals. According to Brunello and Schlotter (2011), personality traits of being conscientious contributes to individuals' capability to learn; whereas personality traits of being agreeable and extravert are associated with the social skills in capability to communicate.

Two studies concerning the development of skilled workers in Indonesia specifically addressed the importance of behavioural skills development in Indonesia (Chan 2016; World Bank 2010). The examination of demand for skilled workers in logistic sector revealed that in addition to academic skills, this sector demands thinking and learning skills and interpersonal skills (Chan 2016). A meticulous survey on both employers and employees in Indonesia showed that generic skills, such as thinking and behavioural skills, are considered important. Regarding behavioural skills, the study underlined the importance of communication skills, creative thinking and capability of working independently for skilled workers and professionals and those in the managerial position

Moreover, a study by Chen et al. (2017) concerning the development of non-cognitive skills in Indonesia confirmed the important role of non-cognitive skills in improving labour market outcomes as stipulated by Heckman and Urzua (2006) and Bowles et al. (2001). Specifically, they underlined the importance of personality traits or "soft skill" in predicting labour market outcomes. Their study indicates that school has contributed to the development of one's personal non-cognitive skills into a more open, conscientious and extrovert individual.

Therefore, the results of the study are useful to identify the room for improvement for education system in Indonesia in order to produce high quality skilled of labour. The supply of Indonesian labour market consists of a large number of workers with a large variation of personality and cognitive capacities who work in the diverse types of jobs. This study is focused on Indonesia labour market, as it is relevant to examine the contribution of both cognitive and non-cognitive capacities on labour market outcomes. Particularly, this study tests the Mincer equation of the determinants of wages. In addition, this paper estimates the role of non-cognitive capacities represented by the personal characteristics on wages. This study also aims to assess the contribution of individual capacities in the labour market of the developing countries with an abundant labour.

## LITERATURE REVIEW

Mincer equation is a prominent model explaining the relation between real wages, education and working experiences (Mincer 1958). This equation was introduced by Mincer through his study on the wages, its distribution

and the role of working experiences and training in the labour market. Mincer (1958) discussed extensively the theoretical background of wages distribution and analysing the relation between human capital and wages in his doctoral dissertation in 1957. The material was also published at the Journal of Political Economy (JPE) in 1958.

Furthermore, Mincer and Becker in 1960 extended the work by focusing on the role of education on labour market. Their work was popularly known as the return on education model that underlying the important role of education on labour market outcomes. Following the return on education model, Mincer (1974) added the working experiences factor in the return on education model to develop a more comprehensive measure of human capital. Mincer (1974) published a book titled *Schooling, Experience and Earnings* in 1974 that established the concept of human capital that relied on education and working experiences.

A large number of empirical studies in economics -such as, Chiswick (2006) and then discusses his analysis of human capital and earnings developed in his 1957 doctoral dissertation and 1958 Journal of Political Economy (JPE, Wannakrairoj (2013) and (Heineck & Anger 2008) - have adopted the Mincer equation in analysing the contribution of human capital in the form of education, training and working experiences in the labour market. The empirical model of Mincer equation is as follows:

$$\text{Log}(Wage_i) = \beta_0 + \beta_1 (\text{Education}_i) + \beta_2(\text{Experience}_i) + \beta_3(\text{Experience}_i^2) + \mu_i \quad (1)$$

The model estimates the rate of return on education by regressing the dependent variable of logarithm of wage on education, years of working experience and square of experience. The return on education is reflected by the value of coefficient  $\beta_1$  that reveals the percentage increase in wages as the workers have more education. In addition, the coefficient of  $\beta_2$  reflects the percentage increase of wages regarding to additional working experiences. Furthermore, the model assumes that the relationship between working experiences and wages is quadratic where the additional wages generated by additional experiences is positive and then reaches its maximum values and further being negative as workers worked longer.

Santoso (2012) and Patrinos (2016) employed the Mincer equation to estimate the return on education. Patrinos (2016) found that return on education was positive that each additional year of education contributes to increase wages between 10 per cent per year on average globally. However, as indicated in Table 1, the rate of return on education across regions in the world was varied. The highest return on education was observed in Sub-Saharan Africa of 12.5 per cent in total. Between gender, the return on education was different where female return was higher than male. In the high-

TABLE 1. Average Returns on Schooling by Region (%)

Region	Total	Male	Female
Sub-Saharan Africa	12.5	11.3	14.6
High Income Economies	10.0	9.5	11.1
Latin America & Caribbean	9.3	8.9	10.8
East Asia & Pacific	9.0	8.8	9.7
Europe & Central Asia	7.8	7.4	9.8
South Asia	7.2	6.3	9.2
Middle East & North Africa	6.5	6.0	10.2
All economies	9.7	9.1	11.5

*Note:* The numbers represent the rate of return, as a percentage increase in earnings to another year of schooling. It is a private rate of return, in the sense that the only costs controlled for are the opportunity costs of not working while in school.

*Source:* Montenegro and Patrinos (2014)

income economies, the return on education was 10% on average. For East Asia and Pacific, the return on education investment was 9%. The rate of return on education is useful to assess the positive contribution of schooling in improving workers' performance. This finding provides strong implication on the important role of education in the development.

The wages level reflects the productivity of workers. An increase of workers' productivity is followed by an increase of wages in all sector of economy (Becker 1975). In addition, Muhi (2010) found that an increase of productivity is due to investment on human capital. Thus, higher productivity leads to higher wage level as wage is the compensation received by workers from their contribution in the production process.

Education is frequently employed to measure the quality of workers. It is argued that education influences workers' productivity. Therefore, workers with higher level of education are more likely to generate better performance and as a consequence receive higher wages (Becker 1993). Muhi (2010) also found that education and training enhance working ability and have a direct influence on better productivity.

Education and training are investment activities as higher education leads to higher level of compensation from working gained by those individuals over time. These are investment as the compensation of having higher education and training will be generated after the investment period is completed. By investing in education and training, individuals have broader knowledge to equip them in conducting their task in the future jobs as well as selecting best occupations that suitable with their expertise and interest. Higher capacities and better decisions contribute to improve workers wellbeing.

A study on Mincer equation in Indonesia was conducted by Comola and De Mello (2013) to understand the role of individual characteristics on wages. Their study showed that among the individual characteristics, education had the most important role in explaining

wages in Indonesia labour market. The study found that, in Indonesia wages increased with educational attainment with the estimated returns on education between 9 per cent to 10.8 per cent. This implies that higher education contributes to an additional of 9 to 10.8 per cent of earnings.

Another study on the Indonesian labour market was accomplished by Purnastuti et al. (2013). They estimated the return on education in the Indonesian labour market using the fourth wave Indonesian Family Life Survey (IFLS). Data from the fourth wave IFLS were collected between 2007 and 2008. They found that on average, the return on education in Indonesia was lower than other countries. In addition, the returns on schooling increased along with higher education level.

As shown in Figure 1, Purnastuti et al. (2013) also acknowledged the different patterns of returns between males and females. According to Deolalikar (1993), female workers from general senior secondary generated higher returns on schooling than those from vocational ones. In contrast, male workers from general senior secondary recorded higher returns on schooling than from vocational senior secondary school.

In addition to education, Purnastuti et al. (2013) and Bozionelos (2004) indicated that labour market outcomes were determined by demographic factors such as gender, age, and marital status. Bozionelos (2004) argued that demographic factors are related to attitude and values of working.

In this study, the role of human capital in the context of Indonesia labour market is examined by using the Mincer equation that underlines the role of cognitive capacities. As suggested in the previous studies, individuals' characteristics in terms of both cognitive and non-cognitive capacities determine the outcomes of labour market. Studies by Cawley, et al. (2001) and Heckman and Urzua (2006) suggested that cognitive and non-cognitive ability are strong predictors of wages after controlling for education. Moreover, the relationship between cognitive ability and education is very strong indicating that school provides mechanism to learn the cognitive skills. Capturing cognitive capacities as determinants of labour market outcome such as wages is relatively common in economics research.

A study by Heckman and Urzua (2006) further elaborated and proved the substantial role of both cognitive and non-cognitive skills to schooling, labour market outcomes and social behaviour. Their study uncovered the fact that skills are very powerful in determining the study performance and school completion rates. Furthermore, the influence of skills into labour market outcome was not limited to wages but also employment, productivity, work experience and choice of occupation whether white or blue collar.

Nonetheless, there were only few papers discussing the role of non-cognitive capacities on labour market outcome, particularly in the developing countries. A

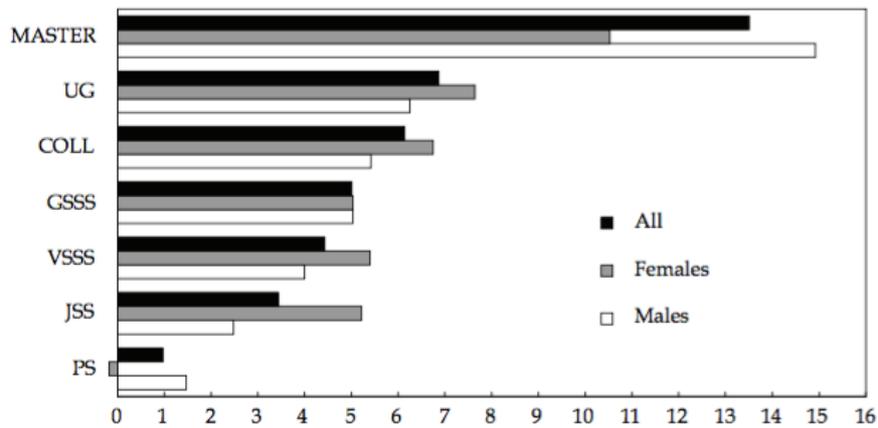


FIGURE 1. Returns on Schooling (%)

Note: PS, primary school; JSS, junior secondary school; VSSS, vocational senior secondary school; GSSS, general senior secondary school; COLL, college; UG, undergraduate degree; MASTER, master’s degree. The primary-school coefficient for the female sample is statistically insignificant.

Source: Purnastuti et al. (2013)

large number of studies in the field of sociology and psychology examined the importance of non-cognitive capacities to both intrinsic and extrinsic career success. Peter Mueser essay (1979) in Jencks (1979) studied the role of non-cognitive skills in predicting occupational attainment and wages. In addition, studies in the field of psychology suggested that non-cognitive skills had significant role in determining the performance of both children and adolescents at school (Wolfe & Johnson 1995; Duckworth & Seligman 2005).

Some studies defined non-cognitive capacities as personality traits (Ham et al. 2009). Pervin et al. (2010) argued that personality is attached to individuals and it is involving along the life cycle due to education, parenting types, gender and environment both physically and socially (Heckman & Kautz 2012; Guido 2011; Mueller & Plug 2006; Boudreau & Boswell 2017). According to Roberts and DelVecchio (2000), the changes of personality are frequently occurred in the young period when the individual is still a child. The personality tends to stable when individuals are mature. Another study by Cobb-Clark and Schurer (2011) also indicated that the changes of personality dimension is relatively small or the changes are not substantial across time. Regarding gender, some studies such as study by Mueller and Plug (2006) and McCrae and Terracciano (2005) indicated that gender had influence on personality.

The Big Five Personality Factors were first introduced by Goldberg in 1971 (John & Srivastava 1999a) to measure personality traits. Those five personality factors are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Mueller & Plug 2006), which were popularly coined as OCEAN to represent the concept. Generally, the concept assumes that the personal characteristics of individual are either they are open, conscientious, extravert, agreeable, or

neurotic. The personality traits will then be discussed in the methodology section based on the data collection of the Big Five Personality Factors of workers in Indonesia.

Conscientiousness and extraversion have positive influences on labour market outcome. Individuals with conscientiousness personality tend to be hard working, productive, punctual, organised, result oriented and responsible. Extraversion also has positive influence on career because this personality is characterized by positive emotion, greater social activity and willingness to take the leadership role.

Meanwhile, individuals with neuroticism personality generally lack positive psychological adjustment and emotional stability. Some studies indicated that neuroticism had negative influence on both intrinsic and extrinsic career success (Ham et al. 2009). Individuals with neuroticism personality are considered less productive due to distresses caused by their excessive negative feelings.

Openness personality belongs to individuals who have fantasy and are full of ideas, aesthetic, smart, thoughtful, curious, innovative, artistic and concerned about values (John & Srivastava 1999b) including the discovery of the five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness). On the other hand, individuals with reticence personality are not innovative; they tend to be practical and introvert, and prefer to do something in routine. Individuals with openness personality are usually creative in the working place (George & Zhou 2001). A creative individual is more likely to be more productive as he applies creative and distinct method for working. Higher productivity leads to higher compensation (Maulana 2012; Raviyanto 1986). In addition, Barrick and Mount (1991) found that individuals with open personality and some working experiences have higher productivity.

Another personality that contributes to working performance is conscientiousness. This personality is characterized by competence, order, dutifulness, achievement-striving, self-discipline, and deliberation (John & Srivastava 1999b) including the discovery of the five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness). Among the five dimensions of personality traits, some studies found that conscientiousness is the strongest non-cognitive predictor of performance in the working place (Dudley et al. 2006; Choi & Lee 2014; Hertz & Donovan 2000). According to Judge and Barrick et al. (1999), conscientiousness has positive influence on both intrinsic jobs satisfaction and extrinsic performance of earnings and status.

The characteristics of extraversion personality are warmth, gregariousness, assertive, tend to be talkative, energetic, enthusiastic, assertiveness, active, excitement-seeking and has positive emotion (John & Srivastava 1999b) including the discovery of the five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness). On the other hand, introvert individual tends to be quiet, cautious, unsociable, and inactive. Barrick and Mount (1991) revealed that extraversion personality has positive relationship with performance particularly in the occupations that require workers to interact socially and to have leadership capacity. In addition, Judge, Heller and Mount (2002) found that extraversion had positive correlation with jobs satisfaction and leadership capability. Furthermore, this personality dimension contributes to extrinsic performance of productivity and career (Boudreau & Boswell 2017).

The fourth personality dimension is agreeableness that the individuals have trust, be straightforwardness, be altruism and compliance, modest and tender-minded (John & Srivastava 1999b) including the discovery of the five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness). Choi and Lee (2014) suggested that individual with agreeableness personality is capable of working well because he has interpersonal skills that enable him to communicate verbally and non-verbally. However, he might lack leadership skills, which makes him difficult to reach the ladder of top career.

The fifth dimension of personality traits is neuroticism. This type of personality is characterised by anxiety, hostility, depression, self-consciousness, impulsiveness, vulnerability. Thus, individuals with this personality tend to be emotionally unstable. Meanwhile, individuals with stable emotion are able to manage their tension, calm and composed in an even tense situation. Judge and Barrick et al. (1999) revealed that neuroticism has negative influence on extrinsic performance of earnings and status because of workers' unstable emotion. In addition, Colquitt et al. (2010) found that individuals with neuroticism personality tend to have lower jobs satisfaction.

## METHODOLOGY

### THE BIG FIVE PERSONALITY FACTORS

This study utilizes the advantage of personality traits data collected by the Indonesia Family Life Survey (IFLS). In addition, a whole set of data of demographic background, education, working experience, tenure and personality traits is also generated from IFLS dataset. Particularly, this study employed the fifth wave IFLS collected between 2014 and 2015. The personality traits information is only available from the fifth wave IFLS data. There are 8,810 samples representing people living in 13 provinces in Indonesia - i.e., Jakarta, Central Java, West Java, East Java, Banten, Bali, Nusa Tenggara Barat, South Sulawesi, South Kalimantan, South Sumatera, Lampung, West Sumatera, and North Sumatera. The fifth wave IFLS data were collected from more than 15,000 households in 4,600 villages. The IFLS survey samples represented about 83 per cent of the Indonesia population living in 13 provinces.

The five factors of personality traits were collected using specific questionnaires containing 15 questions concerning the Big Five Personality Factors. The questions were asked to individuals sampled in the study (Strauss et al. 2016). The big five personality questions are similar with a set of questions in John and Srivastava (1999a). These were asked to respondents and they should select the appropriate statements according to their personality. Table 2 provides a list of 15 questions of personality traits generated from the fifth wave IFLS questionnaires.

The type of personality depends on the respondents' responses on the five major personality questions. Their responses referring to the big five personalities are further transformed into dummy variables in the model representing individuals' personality. The personality traits questionnaire in the IFLS dataset adopts the method developed by John and Srivastava (1999a). The primary interest of the method is to differentiate five types of personality of extraversion, agreeableness, conscientiousness, openness, and neuroticism. The dummy variables enable the researcher to categorize individuals based on their personality traits.

**Extraversion** personality is coded 1 (one) if respondents' answer is between 4 and 5 for questions number 1 and 13; and their response to question number 4 is between 1 and 2. The individual has **conscientiousness** personality if his answers are between 4 or 5 for question number 2 and 12; and their response on question number 9 is between 1 and 2. **Openness** personality belongs to those whose answers are coded 4 or 5 for questions number 3 and 8, and coded 1 or 2 for question number 10. As with **agreeableness** personality, it is referred to those whose answers are coded 4 or 5 for questions number 6 and 11, and coded 1 or 2 for question number 14. Finally, **neuroticism** personality is coded 1 (one) for those whose answers

TABLE 2. The Big Five Personality

No	Question	Personality Traits Correspondence
1	Is talkative	Extraversion
2	Does a thorough job	Conscientiousness
3	Is original, comes up with new ideas	Openness
4	Is reserved	Extraversion (reverse)
5	Is relaxed, handles stress well	Neuroticism (reverse)
6	Has a forgiving nature	Agreeableness
7	Worries a lot	Neuroticism
8	Has an active imagination	Openness
9	Tends to be lazy	Conscientiousness (reverse)
10	Values artistic	Openness (reverse)
11	Is considerate and kind to almost everyone	Agreeableness
12	Does things efficiently	Conscientiousness
13	Outgoing, sociable	Extraversion
14	Is sometimes rude to others	Agreeableness (reverse)
15	Gets nervous easily	Neuroticism

Note: Respondents answer the question correspond to how much they agree with the statements. There are five scales of answer which are (1) Disagree strongly; (2) Disagree little; (3) Neither agree or disagree; (4) Agree a little; (5) Agree strongly.

Source: Indonesia Family Life Survey (IFLS) questionnaire year 2014 Book IIIB.

are coded 4 or 5 for question number 7 and 15, coded 1 or 2 for question number 5.

THE EMPIRICAL MODEL

This study employs some empirical models to understand the role of cognitive and non-cognitive capacities on wages. The cognitive factor is measured by the education level and non-cognitive capacity is proxied by using the personality traits response. The empirical models also include demographic variables, such as gender, age and marital status.

The first empirical model is Mincerian equation estimating the contribution of cognitive capacities measured by education on labour market outcomes proxied by monthly wages. The empirical model is adopted from Purnastuti et al., (2013) as follows:

$$Log(wage) = \beta_0 + \beta_1 yearsofschooling_i + \beta_2 expr_i + \beta_3 expr_i^2 + \beta_4 tenure_i + \beta_5 tenure_i^2 + \beta_6 male_i + \beta_7 married_i + \beta_8 urban_i + \varepsilon_i \quad (2)$$

The second empirical model aims to measure the role of non-cognitive capacities measured by personality traits on labour market outcomes of wages. The dependent variable is monthly wages and the independent variables are the Big Five Personality Factors of dummies - i.e., openness, conscientiousness, extraversion, agreeableness, and neuroticism. The empirical model is as follows:

$$Log(wage) = \beta_0 + \beta_1 openness_i + \beta_2 conscientiousness_i + \beta_3 extraversion_i + \beta_4 agreeableness_i + \beta_5 neuroticism_i + \varepsilon_i \quad (3)$$

Finally, in order to capture both cognitive and non-cognitive capacities of individuals on wages, this study combined the Mincerian equation and personality traits model. Below is the empirical model and Table 3 provides the operational definition of variables:

TABLE 3. Operational Definition of Variables

Log Wage	Natural logarithm of monthly earnings/wages
Years of Schooling	Number of years of schooling
Experience	Number of working experience
Experience <sup>2</sup>	Quadratic of working experience
Tenure	Number of years of tenure
Tenure <sup>2</sup>	Quadratic of number of years of tenure
Dummy Male	Dummy for male workers; 1= male, 0 = female
Dummy Married	Dummy for marital status; 1= married, 0 = single/divorce/widow/ others
Dummy Urban	Dummy for location; 1= urban, 0 = rural
Openness	Dummy for openness personality; 1 = openness, 0 = others
Conscientiousness	Dummy for conscientiousness; 1 = conscientiousness, 0 = others
Extraversion	Dummy for extraversion; 1= extraversion, 0 = others d
Agreeableness	Dummy for agreeableness; 1= agreeableness, 0 = others
Neuroticism	Dummy for neuroticism; 1= neuroticism, 0 = others

$$\begin{aligned} \text{Log}(\text{wage}) = & \beta_0 + \beta_1 \text{yearsofschooling}_i + \beta_2 \text{expr}_i + \\ & \beta_3 \text{expr}_i^2 + \beta_4 \text{tenure}_i + \beta_5 \text{tenure}_i^2 + \\ & \beta_6 \text{male}_i + \beta_7 \text{married}_i + \beta_8 \text{urban}_i + \\ & \beta_9 \text{openess}_i + \beta_{10} \text{conscientiousness}_i + \\ & \beta_{11} \text{extraversion}_i + \beta_{12} \text{agreeableness}_i + \\ & \beta_{13} \text{neuroticism} + \varepsilon_i \end{aligned} \quad (4)$$

The ordinary least squares are employed to estimate all empirical models.

RESULTS AND DISCUSSION

The total number of respondents to be observed is 8,810 with age between 15 to 87 years old. The samples consisted of individuals working in the past one month and working as full-time employees in public and private sectors. Among the samples, the average age was 35 years old and most workers studied for 10 years. Regarding monthly earnings, the average wage was USD161.4. As with their working experience, the average was 17 years of experience and 7 years of tenure. Table 4 presents descriptive statistics of numeric variables.

TABLE 4. Descriptive Statistics

Variable	Obs.	Means	Std. dev	Min.	Max.
Age	8,810	35	10.92	15	87
Wage (US\$)*	8,810	161.4	174.4	0.56	3.62
Years of Schooling	8,810	10.85	4.05	0	24
Experience	8,810	16.66	12.20	0	80
Tenure	8,810	6.78	7.81	0	54

Source: research data

\* 1 USD= IDR 12,440 (Bank Indonesia currency data)

With regard to the personality traits, this study analysed the respondents' answers on the Big Five Personality Factors questions. The data show that Indonesian workers were mainly characterised as individuals with conscientiousness, agreeableness and extraversion personalities. Meanwhile, the proportion of individuals with characteristics of openness and neuroticism are much lower (see Table 5).

The results of the first estimation of Mincerian equation in Table 6 shows that most of all variables are strong predictors of labour market outcome. The results are robust by using four different specifications of OLS1, OLS2, OLS3 and OLS4. The OLS1 captures the effect of human capital investment in the form of schooling. The OLS2 captures the role of personality traits on monthly earning. The OLS3 combines all possible factors included school and personality traits that determines the monthly wages. Finally, OLS4 estimates the contribution of both cognitive and non-cognitive skills by interacting the schooling and personality traits.

TABLE 5. The Type of Personality of Indonesian Workers 2014-2015\*

Type of Personality	Freq.	Proportion (%)
Openness	195	2.21
Conscientiousness	4,717	53.54
Extraversion	2,408	27.33
Agreeableness	4,493	51.00
Neuroticism	186	2.11

Source: research data

Note: \*the total proportion of all types of personality is larger than 100 per cent because one individual may classify into two types of personality depending on the individuals' characteristic.

The estimations suffer from the heteroscedasticity issue. The Breusch-Pagan/Cook-Weisberg test shows that the null hypothesis was rejected with chi-square test of 97.58. In order to manage the heteroscedasticity problem, this study employs the robust standard error. In addition, this study tests the multicollinearity assumption using the Variation Inflation Factor (VIF). The mean score of VIF for all explanatory variables is 3.85 and this is less than 10 suggesting that the model is free from multicollinearity issue. Meanwhile, the VIF score of each explanatory variables show that experience and tenure suffer high collinearity because the variables are also taken into quadratic form. This is the basic assumption of the Mincer model that experience and tenure are assumed to be linearity declining rate of post-school investment so we must add the variable in the quadratic form (Heckman, et al. 2003).

The level of education has positive and statistically significant influence on monthly wages. In addition, the years of experience and tenure have positive and significant contribution on monthly wages. These findings support the human capital theory that investment on education contributes to an increase in labour market outcome. In addition, worker's knowledge developed from pervious and current works has significant contribution to the improvement of workers' skills that lead to higher compensation.

The relation between square of experiences and monthly wages is also statistically significant. As predicted by literature, the relation between the two variables are forming the quadratic function. In the beginning, a higher number of experiences contributes positively to wages. However, after reaching its highest point, the relation between experience and wages is negative indicating a decreasing return.

The estimations also show that demographic factors of gender and location have significant influence on wages. Male workers performed better and generated higher earnings than their female counterparts. In addition, workers residing in urban areas generated higher earnings than those living in rural areas.

TABLE 6. Ordinary Least Square Regression (OLS)

	OLS (1)	OLS (2)	OLS (3)	OLS (4)
Years of Schooling	0.079*** (0.003)		0.078*** (0.003)	0.075*** (0.003)
Experience	0.025*** (0.003)		0.025*** (0.003)	0.025*** (0.003)
Experience <sup>2</sup>	-0.001*** (0.000)		-0.001*** (0.000)	-0.001*** (0.000)
Tenure	0.028*** (0.004)		0.028*** (0.004)	0.028*** (0.004)
Tenure <sup>2</sup>	-0.000 (0.000)		-0.000 (0.000)	-0.000 (0.000)
Dummy Male	0.463*** (0.019)		0.469*** (0.020)	0.469*** (0.020)
Dummy Married	0.003 (0.025)		0.001 (0.025)	0.001 (0.025)
Dummy Urban	0.240*** (0.021)		0.240*** (0.021)	0.240*** (0.021)
Openness		-0.167* (0.072)	-0.023 (0.059)	
Conscientiousness		0.118*** (0.021)	0.027 (0.019)	
Extraversion		0.077*** (0.023)	0.061** (0.020)	
Agreeableness		0.007 (0.021)	-0.003 (0.018)	
Neuroticism		-0.147* (0.072)	-0.029 (0.064)	
Openness_education				-0.000 (0.006)
Conscientiousness_education				0.003 (0.002)
Extraversion_education				0.005** (0.002)
Agreeableness_education				0.001 (0.002)
Neuroticism_education				-0.005 (0.006)
Constant	12.44*** (0.045)	14.03*** (0.019)	12.43*** (0.046)	12.46*** (0.045)
Observations	8,808	8,810	8,808	8,808
R <sup>2</sup>	0.257	0.007	0.258	0.258
VIF	3.85			

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

This study is particularly intended to examine and address the contribution of personality traits on wages. The estimations in Table 5 show that out of the five personality traits, the strong predictors are openness, conscientiousness, extraversion, and neuroticism. This result is based on the OLS2 where the model only controls the personality traits in examining the determinants of personality traits on wages. The strongest predictors are conscientiousness and extraversion, which contribute positively to performance. Meanwhile, being open and having neuroticism personality are contra productive to the performance as the coefficients of both variables are negative.

Literature predicts that neuroticism negatively contributes to wages due to unstable emotion of the individuals. It is also predicted that openness has positive contribution on wages while in Indonesia the contribution is negative. However, after controlling the school and other demographic information, the role of non-cognitive capacities is lower and only extraversion has positive and significant contribution on wages. This is consistent with the study by Chen et al. (2017) which found an evidence of school contribution in developing personality skills of Indonesian workers. Indeed, schooling has a significant role in increasing individuals' conscientiousness, openness, and extroversion. The estimation in OLS4 that

interacts schools and personality traits shows that the contribution of extraversion personality is statistically significant in explaining labour market outcomes.

In the case of Indonesia, personality traits have a role in determining the labour market outcome. This is particularly relevant for individual with extraversion personality. Three OLS estimations of OLS2, OLS3 and OLS4 in Table 5 provide evidence that coefficients of extraversion are positive and statistically significant. Individuals with extraversion personality performed well because they have positive energy and emotion. Their personality is characterised by being warm, assertive and talkative, which gives them capability to engage socially. These characteristics also enable them to perform as a leader in their working place. This finding supports the literature of Barrick and Mount (1991), Judge et al. (2002) and Boudreau and Boswell (2017) that extraversion personality has positive relationship with performance due to workers capability to interact socially and to have leadership capacity.

This study also reveals interesting findings that openness and conscientiousness personalities have positive contribution on wages however they are not statistically significant. The literature suggests that open individuals are creative so it enables them to be more productive and gain higher compensation (George & Zhou

2001; Maulana 2012; Ravianto 1986). Literature also underlines the strong contribution of conscientiousness to workers' performance. Moreover, some studies found that among five dimensions of personality traits, conscientiousness is the strongest non-cognitive predictor of performance in the working place (Dudley et al. 2006; Choi & Lee 2014; Hurtz & Donovan 2000). Individuals with this type of personality are competent, work in order, dutifulness, achievement-striving, self-discipline, and deliberation (John & Srivastava 1999b) including the discovery of the five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness).

The elasticity of some variables can be seen in Table 7. Education variable is a strong predictor of wages where an increase of years of schooling for 1 per cent contributes to increased wages by 0.85 per cent. The years of experience also contribute to wages that each additional 1 per cent of experiences leads to 0.43 per cent increase of monthly wages. Moreover, tenure period also has positive influence on wages that each 1 per cent additional of tenure leads to 0.179 per cent increase of wages.

Finally, this study also supports the literature that neuroticism has negative contribution on performance. It is important to behave and work with positive energy to have better output. Incapability to manage and control the emotion leads to distraction so workers could not be productive. Having agreeable personality is not beneficial for the workers as the coefficients of the variable are not statistically significant. It seems that a lack of leadership

of individuals with agreeable personality is becoming an issue in enhancing productivity.

This paper also concerns with the determinants of cognitive and non-cognitive capacities across gender. Table 8 provides estimation results of three estimation models of OLS1, OLS2 and OLS3. Generally, the results are similar with estimation using total sample. Cognitive capacities measured by the years of schooling have positive and statistically significant influence on monthly wages. These are observed for both male and female workers. The contribution of working experience and tenure is also positive and statistically significant indicating longer years of experience and tenure are effective in improving and broadening knowledge and skills of the workers both male and female.

As with demographic factors, the estimations show that married male workers performed better while the performance of married female workers was lower than unmarried female workers. Married female workers may have a problem of managing time and energy for working and household responsibility at the same time, thus it impeded them to improve their working performance. Referring to the location, both male and female workers who lived in urban area generated higher earnings than those residing in rural area.

Considering the role of non-cognitive capacities on labour market outcome, the estimations show that both male and female workers with extraversion personality performed better in the labour market. Meanwhile, conscientiousness has positive effect on earnings for male workers but not for female workers. In addition, the

TABLE 7. Elasticity of Independent Variables

Variable	OLS1	OLS2	OLS3	OLS4
Years of Schooling	0.86***		0.85***	0.81***
Experience	0.43***		0.42***	0.42***
Experience <sup>2</sup>	-0.232***		-0.229***	-0.43***
Tenure	0.189***		0.189***	0.189***
Tenure <sup>2</sup>	-0.000		-0.000	-0.000
Dummy Male	0.281***		0.285***	0.285***
Dummy Married	0.002		0.001	0.001
Dummy Urban	0.173***		0.173***	0.173***
Openness		-0.004*	-0.001	
Conscientiousness		0.063***	0.014	
Extraversion		0.021***	0.017**	
Agreeableness		0.003	-0.001	
Neuroticism		-0.003*	-0.001	
Openness_edu				-0.000
Conscientiousness_educ				0.018
Extraversion_educ				0.016**
Agreeableness_educ				0.005
Neuroticism_educ				-0.001

Note: \* p < 0.05. \*\* p < 0.01. \*\*\* p < 0.001

TABLE 8. Ordinary Least Square Regression (OLS) across Gender

Log wage	OLS 1		OLS 2		OLS3	
	Male	Female	Male	Female	Male	Female
Years of Schooling	0.075*** (0.003)	0.076*** (0.005)			0.075*** (0.003)	0.074*** (0.005)
Experience	0.034*** (0.004)	0.014** (0.004)			0.033*** (0.004)	0.013** (0.004)
Experience <sup>2</sup>	-0.001*** (0.000)	-0.000*** (0.000)			-0.001*** (0.000)	-0.000*** (0.000)
Tenure	0.016*** (0.004)	0.047*** (0.007)			0.016*** (0.004)	0.047*** (0.007)
Tenure <sup>2</sup>	-0.000 (0.000)	-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)
Dummy Married	0.124*** (0.031)	-0.164*** (0.039)			0.121*** (0.031)	-0.166*** (0.039)
Dummy Urban	0.201*** (0.024)	0.314*** (0.038)			0.202*** (0.024)	0.316*** (0.038)
Openness			-0.037 (0.078)	-0.232* (0.115)	0.034 (0.068)	-0.087 (0.096)
Conscientiousness			0.129*** (0.024)	0.076* (0.037)	0.047* (0.022)	0.002 (0.033)
Extraversion			0.115*** (0.027)	0.169*** (0.038)	0.061* (0.024)	0.071* (0.033)
Agreeableness			0.009 (0.024)	-0.009 (0.037)	-0.007 (0.021)	0.011 (0.032)
Neuroticism			-0.016 (0.087)	-0.125 (0.104)	0.040 (0.080)	-0.091 (0.096)
Constant	12.848*** (0.051)	12.578*** (0.076)	14.195*** (0.021)	13.743*** (0.033)	12.827*** (0.052)	12.569*** (0.078)
R <sup>2</sup>	0.211	0.238	0.010	0.009	0.213	0.240

Note: \*p< 0.05. \*\*p< 0.01. \*\*\*p< 0.00

contribution of openness personality and neuroticism are positive for male workers but the coefficients are negative for female workers, even though the coefficients are not statistically significant. This is consistent with the finding of study by Chen et al. (2017) which suggests that the effect of personality traits on labour market outcome is more profound for male than female workers. A study by Heckman and Urzua (2006) also found that the effect of personality traits is slightly different between male and female workers. However, in their study the effect of personality skills is less strong for male compared to female workers.

The robustness check is also conducted by estimating OLS 3 across groups with different income level. The quantile regression method is suitable to examine whether the role of cognitive and non-cognitive capacities on earnings are consistent across earnings levels. In addition, estimating the quantile regression is recommended as the data distribution is not homogeneous, as it is not symmetric or it has truncated distribution.

The quantile regression is able to estimate the model across three groups of workers according to their earnings level. The method classifies the samples into three quantiles which are the low-income group with earnings level under the 25 quantiles (Q25); the medium income group under the 75 quantiles (Q75); and, the high-income group under the 90 quantiles (Q90). Based on the quantile data distribution, the low-income groups comprised workers with monthly earnings between IDR 80,000 and 800,000. The medium income workers are those with monthly earnings of IDR 800,000 to IDR 2,600,000. Finally, the highest income group consisted of workers with monthly earnings between IDR 2,600,000 and IDR 4,000,000.

Table 9 reveals eminent information on the role of cognitive, non-cognitive and demographic factors on earnings across different income levels. The years of schooling is more important for upper income groups while experience is more influential for lower income groups. These findings support the view that the role of education is important in enhancing workers' performance in order to generate higher earnings. Furthermore, the coefficient of dummy of male is higher for lower income groups, indicating the wage discrimination between gender is more prevalent in the lower income group in which the education level is lower.

Regarding the non-cognitive capacities, the findings are consistent between estimation using all respondents and quantile regression estimations. The estimations are able to uncover the different roles of personality across different income groups. Within the lowest income group, conscientiousness has the largest role in determining earnings. Meanwhile, this type of personality did not significantly influence earnings within upper income groups. Another strong personality in determining earnings is extraversion. Moreover, the estimations reveal that extraversion is the strong predictor of earnings for upper income level of Q75 and Q90.

The findings are consistent with the study by Fletcher (2013) which revealed that both extraversion and conscientiousness have much stronger effect on employment. Fletcher (2013) estimates that the association between standard deviation of increase in extraversion or conscientiousness and an increase in employment is positive. Conscientiousness is a strong determinant of outcome for the lowest income group as their jobs tend to be technical which require them to be organized, responsible and hardworking.

TABLE 9. Quantile Regression on OLS3

	Q25	Q75	Q90
Years of Schooling	0.074*** (0.004)	0.080*** (0.003)	0.081*** (0.004)
Experience	0.027*** (0.004)	0.015*** (0.002)	0.012*** (0.003)
Experience2	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Tenure	0.025*** (0.005)	0.024*** (0.003)	0.026*** (0.004)
Tenure2	0.000 (0.000)	-0.000* (0.000)	-0.000*** (0.000)
Dummy Male	0.605*** (0.025)	0.266*** (0.016)	0.292*** (0.023)
Dummy Married	0.001 (0.033)	0.035 (0.022)	0.062* (0.029)
Dummy Urban	0.354*** (0.027)	0.116*** (0.018)	0.120*** (0.024)
Openness	-0.118 (0.082)	-0.034 (0.054)	-0.037 (0.072)
Conscientious- ness	0.067** (0.025)	-0.004 (0.017)	-0.023 (0.023)
Extraversion	0.044 (0.027)	0.045* (0.018)	0.089*** (0.025)
Agreeableness	0.011 (0.025)	-0.010 (0.016)	-0.032 (0.022)
Neuroticism	-0.044 (0.083)	-0.023 (0.055)	-0.054 (0.075)
Constant	11.824*** (0.067)	13.260*** (0.039)	13.577*** (0.052)
Observations	8808	8808	8808

Note: \*p< 0.05. \*\*p< 0.01. \*\*\*p< 0.0

Meanwhile, the upper income level workers are more likely to hold a managerial position or be a leader in the organization. This typical position requires individual to be sociable and energetic, inspiring and assertive, which are the characteristics observed from the extrovert individuals.

## CONCLUSION

This study aims to examine the role of cognitive and non-cognitive capacities on labour market outcome in Indonesia. The current literature in economics have

acknowledged the role of non-cognitive capacities in determining workers' performance. So far, Indonesia education and labour market system have neglected the development of non-cognitive capacities.

The fifth wave Indonesian Family Life Survey (IFLS) data collected between 2014 and 2015 were employed to compile the data on demographic and labour market. The use of IFLS data is one of the contributions of this study as the data is rich, representing 86 per cent of Indonesian population and collecting the psychometric data of personality traits. The ordinary least squares model of cross section was employed to estimate the empirical models. The total number of samples is 8,810 individuals working full time at least in the past one month in both public and private sectors.

The modified Mincer equation was estimated to examine the role of schooling, working experience, tenure, demographic factors and personality traits on monthly wages. The results show that cognitive capacities measured by schooling and non-cognitive of personality traits determine the labour market outcomes. Attending higher degree of education explains higher performance of labour. In addition, extraversion personality is strong predictor of performance of workers especially those in the upper tail of income distribution. Furthermore, the contributions of marital status and personality traits are varied between male and female workers.

There are some policy implications derived from the findings. Generally, the education and labour market policies should consider the development of both cognitive and non-cognitive to improve labour market outcomes. Concerning education sector, first policy implication is improving the curriculum and learning method from primary, secondary and tertiary education in order to develop the academic skills, generic skills and technical skills. With regard to the generic skills, this study provides evidence that personality traits contribute to labour market outcome. Thus, the curriculum and learning method should be redesigned to develop personality capacities, such as self-confidence, social skills, ability to express their opinion, eagerness to new experience, ability to communicate, teamwork, leadership skills and organized work ethic. In addition, the development of curriculum should be aligned with the needs of industry. Finally, as suggested by World Bank (2010), the development of skills can be properly conducted by means of on the job-training and internship through co-workers and supervisors.

## NOTES

- 1 One respondent could be classified into more than one characteristics as individuals' personality may tend into more than one characteristics among the big five personalities.

$$se(\hat{\beta}_j) = \sqrt{\frac{\sum_{i=1}^N e_{ji}^2 e_i^2}{RSS_j^2} \times \frac{N}{N-K-1}}$$

Source: Chen (2002)

- <sup>3</sup> VIF Score for each explanatory variable is available in the bracket.  
 Schooling (1.57); Experience (12.41); Experience<sup>2</sup> (10.29); Tenure (8.94); Tenure<sup>2</sup> (8.14); Dummy married (1.45); Dummy male (1.03); Dummy urban (1.02); Openness (1.01); Conscientiousness (1.09); Extraversion (1.03); Agreeableness (1.06); Neoriticism (1.01).
- <sup>4</sup> Elasticity is calculated by multiplying the coefficient of the variable and its means value

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