“Technology transfer motive of managers in Eastern Asia: empirical results from manufacture industry in Banten province, Indonesia”

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SECTION 2. Management in firms and organizations

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Technology transfer motive of managers in Eastern Asia: empirical results from manufacture industry in Banten province, Indonesia

Abstract

Empirical results state that large number of Eastern Asia managers in Banten province lack of technology mastery. It causes low employees productivity. The purpose of this study is to search for explanation of causality among variables to assess research hypotheses. Population used in this study is employees in an organization led by foreign managers from Eastern Asia. Purposive sampling technique is used to decide samples. Criteria to determine samples are: 1) operating in Banten province; 2) employing foreign workers, and 3) having at least 300 workers. There are 200 distributed questionnaires in this study, and 138 manageable questionnaires are left.

Main results from this study state that technology transfer motive influences the strength of relationship, local employee personal capacity and technology mastery. Also, it impacts the strength of relationship and local employee personal capacity in the enhancement of employees productivity, yet, technology mastery cannot improve employee productivity. It is in line with the results by Argote and Ingram (2000), yet, it contradicts with Nonaka's study (1994) which states that technology competence influences productivity.

Keywords: technology transfer motive, the strength of relationship, personal capacity, technology mastery, productivity, Banten, Indonesia.
JEL Classification: M12, M21, M54.

Introduction

The amount of foreign investment (FI) still grows positively as 33% with 555.3 million $. It is decreasing compared with the previous year by 50%. Nevertheless, total investment of FI in 2014 causes deeper reduction by -55% compared with 2012 by -36%. In 2014, investment realization of FI in Banten province comes from raw steel manufacturing industry, steel material, machine and electronics. The amount of foreign investment in these sectors is 573.7 million $ and 1.9 billion $.

Data from Indonesian Ministry of Manpower and Transmigration stated that most of FW in Indonesia is from China. It is due to the characteristic of Chinese who work in merchant industry and small companies. It is consistent with country based distributed composition. Viewing from their residence in foreign country, most of the respondents live in Japan (19%), India (13%), South Korea (11.9%) and Singapore (7.4%) (Indonesian Ministry of Manpower and Transmigration, 2014).

Based on previous results, it can be formulated as follows: though there is a significant amount of Eastern Asia managers in Banten province, their lacked technology competence impacts on low employee productivity. Therefore, the purpose of this study is to test transfer motive of Eastern Asia managers in manufacture industry in Banten province.

1. Literature review

The importance of technology transfer showed by Ng et al. (2012) stated that dynamic process from capability development will improve technology transfer in domestic workers compared with its foreign development.

Miller (2011), then, showed that the development and maintenance of network relationship can significantly improve the knowledge development and retention in technology transfer process. Knowledge is recognized as important input in innovation and technology transfer process (Reychav and Weisberg in Miller et al. (2011). Therefore, the usage of absorbent capacity theory to explore the role of proper importance and relationship in defending knowledge is still relevant (McAdam et al., 2010).

Other authors, such as Landry and Amara (2012), stated that the management of Knowledge and Technology Transfer Organizations (KTTO) will help in supervising business model by inviting KTTO manager to view the whole knowledge and technology transfer. Tungli and Peiperl (2009) presented a comparison analysis of foreign managers practice in large multinational organization at four different countries. They investigated the managers in time at some operational foreign areas. Compared with Peterson et al. in Tungli and Peiperl (2009), there is an observable changing in the decreasing amount of company's return (based on Japanese country that uses Western expatriate workers as sample).

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Hocking et al. (2007) investigated how expatriate contributes in transnational strategy company reach the purpose of global efficiency, learning process, and national and local reponse. Interesting results by Wang (2013) showed that both mechanisms will be able to improve the knowledge rate of network members. Changeable mechanism will be much more efficient, since it can improve both sides' value. According to information speed based on economy development, knowledge has become strategic asset in an organization (Bollinger and Smith in Wang, 2013). The study on knowledge transfer comes from the discussion on technology transfer. Teece in Wang (2013) researches technology transfer phenomena by exploring two aspects: 1) transfer cost, and 2) transfer decided factors comprehension. This study showed that an organization will be able to collect a large amount of knowledge through technology transfer.

Verification results on knowledge transfer from Ma and Pan (2013) stated that the strength of relationship has positive and significant impact on knowledge and technology transfer, but not on innovative knowledge, especially on internally integrated ability. Besides, innovative knowledge on product and process innovation includes new design ideas, new product solution, new knowledge condition, and new technical parameters (Gill and Martin – Bautista, 2012). Based on social capital structure perspective, the strength of relationship describes technology alliance as a model which shows structural factor traits including innovation network and social bond (Carles, 2007).

2. The development of empirical research model and hypotheses testing

2.1. The relationship between technology transfer motive of Eastern Asia managers and the strength of relationship. Based on the success of Triple Helix framework, which consists of the interaction among scholars, government and industry, Etzkowitz (2003) highlighted the need of interactive innovation network among scholars, company and government to facilitate many kinds of knowledge and action as the keeper of organizational competitive advantage through new product, process and services (Etzkowitz, 2003; Fritsch and Slavtchev, 2007). The role of this network is various, since the need of knowledge is also different. It depends on technology transfer (Mc Adam et al., 2010). Yet, the development of closed relationship with many agents will be main element in organization's success and effort (Perez and Sanchez, 2003). Working cooperatively with many networks will be an important factor that will increase ideas and knowledge formation in the beginning phase of technology transfer (McAdam et al., 2010; Knockaert et al., 2010). Since then, scholars often investigate business manager's skills and network that will provide the needed skills to improve organization (Rothermel et al., 2007; Perez and Sanchez, 2003; The Lambert Report (HMSO), 2003; and Huggins et al., 2008), highlighting the topic on flexible and dynamic networks as important factors for organization to start organization's new operation bussiness in foreign countries.

Based on the explanations above, we postulate the first hypothesis:

H1: Technology transfer motive is closely related to the strength of relationship of foreign managers and local employees.

2.2. The relationship between technology transfer motive of Eastern Asia managers and the technology mastery of local employees. Knowledge is viewed as significant potential resource to reach organizational competitive advantage (McCam and Buckner, 2004). Grant (1996) claimed knowledge transfer as a main route for an organization to share and create knowledge, that will push competitive advantage (Desouza and Evaristo, 2003; Bandyopadhyay and Pathak, 2007; Liu and Liu, 2008). The ability to search and defend knowledge transfer will facilitate higher rate of innovation (Strach and Everett, 2006; Cummings and Teng, 2003). Knowledge transfer will facilitate innovation through problem identification, solution alternatives, evaluation, and transferred knowledge (Brockman and Morgan, 2003).

Based on the explanations above, we postulate the second hypothesis:

H2: Technology transfer motive is positively related to technology mastery of local employees.

2.3. The relationship between technology transfer motive of Eastern Asia managers and the personal capacity of local employees. The researches of technology transfer motive in China focus on the weaknesses of China's Emerging Multinationals (CEMs), especially for China State Owned Enterprises (Badan Usaha Milik Negara or BUMN) and the lack of market-oriented experience in domestic manufacturing industry (Nolan and Zhang, 2003; Rugman and Li, 2007). Culture dynamic actually impacts on how an organization performs in international environment (Hofstede, 1983; Adler and Graham, 1989). The authors considered the importance of variation comprehension in national culture as its relationship with organizational theory and practices. Various cultures inter nations will halt the success of technology transfer inter boundary (Kedia and Bhagat, 1998; Chatterjee et al., 1992). This situation specifically records that culture fitness will be an important recommendation (Weber et al., 1996;

Hakanson and Nobel, 2001; Badawy, 2009). As a result, national culture differentation will predict the difficulty of knowledge transfer in organizational acquisition process.

Based on the explanations above, we postulate the third hypothesis:

H3: Technology transfer motive is positively related to personal capacity of local employees.

2.4. The relationship between the strength of relationship and technology mastery of local employees. Belief is often considered as subject's behavior expectation to reach reliability and goodwill which is showed by community, organization and individual (Nyhan and Johnson, 1996; Lemmink, 2000). Mattingly et al. (2011) believe that strong relationship will be connected with positive characteristic of relationship.

Based on the explanations above, we postulate the fourth hypothesis:

H4: There is a positive relationship between the strength of relationship and technology mastery.

2.5. The relationship between personal capacity of local employee and technology mastery in manufacture industry. Dynamic theory belongs to Nonaka (1994) who stated that organizational knowledge is used as theoretical background to transfer the kind of certain knowledge. Organizational learning theory, arranged by Argrys and Schon in Awang et al. (2013) and confirmed by Argote and Ingram (2000), Argote (1999) and Nonaka and Takeuchi (1995) provided relevant trait and factor foundation to transfer knowledge from foreign multinational organizations to local employees or from local employees to main company and its subsidiary. In joint venture and strategical alliance, Powell et al. (1996), Haunzchikd and Miner (1997), Kao et al. (2006), Foss and Pedersen (2002) proved organization's natural knowledge transfer and its mechanism in an organization.

Among its predictors, knowledge transfer must always consider organizational reward factor, promotion and system compensation, organizational learning culture, employee absorbness, and crucial social capital (Chiang, 2007; Dayasindhu, 2002; Gopalakhrisnan and Santoro, 2004; Gupta and Govindrajan, 2000; Lubit, 2002; Lucas, 2006; Seidman and McCauley, 2005; Ward, 2007). Local employee absorbness theory is introduced by Cohen and Levinthal (1989, 1990). Zahra and George (2002) concepted that technology transfer is an important factor in absorbing knowledge to trigger innovation. Related knowledge, skills including trait in learning place, optimum working hours use, and innovative spirit will push self development, common language, and relevant working experience (Cohen and Levinthal, 1990; Szulanski, 2003; Sparkes and Miyake, 2000; Downes et al., 2000; Santoro and Gopalakrishnan, 2000). Active knowledge transfer results in competitive advantage and steady operational system in different business environments (Kogut and Zander, quoted in Minbaeva and Michailova, 2004; Connelly et al., 2007). Transnational strategy will be continuously used to promote competitiveness (Connelly et al., 2007; Lubit, 2001; Buckely et al., 2006; Tang et al., 2008).

Based on the explanations above, we postulate the fifth hypothesis:

H5: There is a positive relationship between personal capacity of local employees and technology mastery.

2.6. The relationship between technology mastery in manufacture industry and employees productivity. Analyzing the examples of pioneer company showed that strategic technology plan plays an important role in developing external success of technology exploitation (Chesbrough, 2003; Lichtenthaler, 2005; Davis and Harrison, 2001; Escher, 2003). Although many companies develop external technology exploitation strategy, they are still pursuing for a method to exploit technology (Lichtenthaler, 2005; Ford and Ryan, 1981). In many companies that have adopted strategic method to technology planning in open innovative context, plan and external technology exploitation will be an important planning process (Ford, 1988; Davis and Harrison, 2001). Therefore, external technology exploitation planning must be attached in organizational planning process (Brockhoff, 1998; Kostoff and Schaller, 2001; Albright and Kappel, 2003; Ford, 1988; Escher, 2003). An organization which has certain technology solution to face industrial difficulty will be unique company, different from main product business (Lictenthaler, 2005; Frishammar and Horte, 2005).

Based on the explanations above, we postulate the sixth hypothesis:

H6: There is a positive relationship between technology mastery of local employees and employee productivity.

2.7. The relationship between the strength of relationship and employees productivity. There have been many research results on technology transfer to strengthen competitiveness from scholars in 1980s (Cao et al., 2006; Chen and Kenney, 2007). In investment perspective, an individual company will be relevant with technology enhancement only if they promise to yield real additonal opportunity in company's benefit and growth (Dosi, 1988). In

China in 1990s and the beginning of 2000s, such market mechanism will not give incentive to an organization, so that they can be competing in low worker cost and technology import (Chen, 2007; Lee et al., 2011; Nelson, 2008; Ernst and Kim, 2002). Yet, transfer changing policy applied in the previous year will be impacted in 2013, where China can pursue America in technology mastery in manufacturing industry and global market till it reaches 24% share (Salim, 2014).

It is also important to note that the dynamic technology transfer system not only depends on foreign managers, but also on technology development. Potential receiver characteristics will also become the main factor (Bozeman, 2000; Stroh, Gregersen & Black, 2000). In foreign employees relationship, the organization will lose contact with colleagues, social network and supervisors in domestic organization (Lazarova & Caliugri, 2001; Linehan and Scullion, 2002; Vidal et al., 2007).

Based on the explanations above, we postulate the seventh hypothesis:

H7: There is a positive relationship between the strength of relationship and employee productivity.

2.8. The relationship between personal capacity of local employee and local employee productivity. To show the actual business impact in knowledge management (KM) and technology value as a proper facilitator in sharing and distributing organizational knowledge (Easterby – Smith, Crossan & Nicolini, 2000; Firestone & McElroy, 2004), Dyer and McDonough (2001), Hauschild et al. (2001), Santosus and Surmacz (2001) explained the benefit of knowledge management as to enhance productivity, efficiency, speed response, and business function. Meanwhile, the main problem in technology transfer successful perfomance is organizational culture. It, especially, occurs in such more competitive environment where certain knowledge becomes unclear (Bixler, 2002; Dyer and McDonough, 2001; Santosus and Surmacz, 2001; Alter, 2000).

Based on the explanations above, we postulate the eighth hypothesis:

H8: There is a positive relationship between personal capacity of local employees and employee productivity.

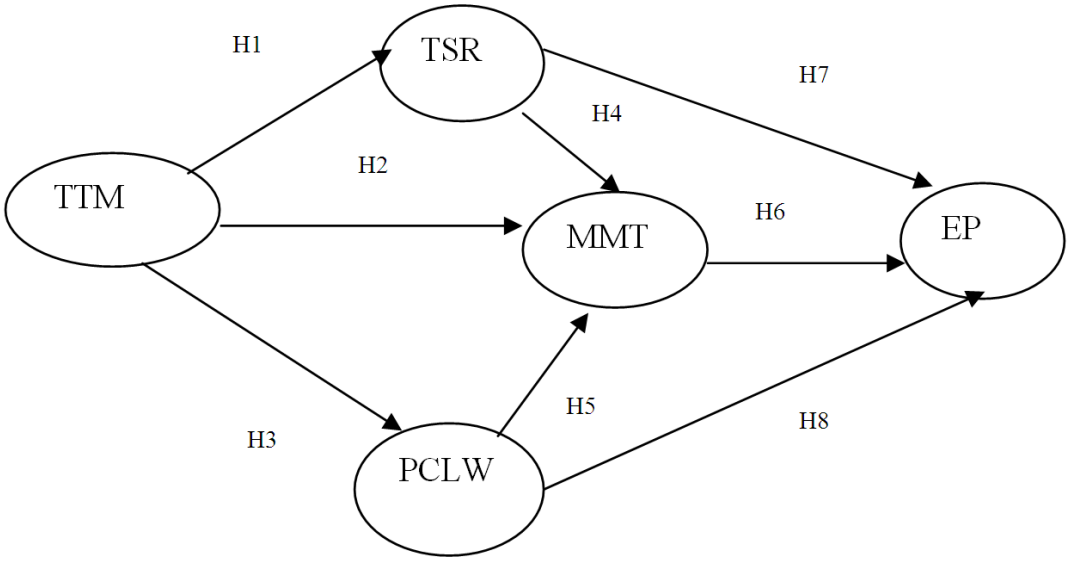

Fig. 1. Empirical research models

Note: TTM = technology transfer motive, TSR = the strength of the relationship, MMT = mastery of manufacturing technology, PCLW = personal capacity of local employees, EP = employees productivity.

3. Method

Population, in this study, is the employees in organization led by foreign managers in Eastern Asia. Sampling determination uses purposive sampling technique which has three criteria: 1) the company operates in Banten province; 2) the company has foreign manager or foreign workers; 3) the company has at least 300 employees. Questionnaires are distributed to 200 respondents, and 138 manageable questionnaires are left.

Measurement of variables for technology transfer motive is based on research by Chung (2000) and Hofer (2009), with indicators like skills, knowledge, methods, sample manufacturing and facilities, using a Likert scale of 1-7 which shows the scale of 1 for strongly disagree and scale of 7 for strongly agree. Further to the variable relationship strength refers to research by Martinez (2004), Caughlin (2002) and Rancer & Infante (1985), which use indicators like spirit of partnership, rules and procedures, constraints faced during the process of transfer of

knowledge and technology, support training programs and an adequate budget, and resistance to apply new knowledge and technologies, using a Likert scale of 1-7 which shows the scale of 1 for strongly disagree and scale of 7 for strongly agree.

Variable for control technology uses knowledge about how to learn to produce (function) and about what happens when people are learning (process) to help participants of an effective training program to develop new knowledge and skills as a teacher, the manager, and administrators (product) (Smith, 1982; and Ertner and Newby, 1993) and for Employee Personal Capacity variable refers to research by Firestone and McElroy (2004), Santosus and Surmacz (2001) and Alter (2000), while the latter for variable employee productivity is based on research by Cao et al. (2006), Chen and Kenney (2007), Dosi (1988), Chen (2007) and Lee et al. (2011).

Data analysis method uses structural equation modelling (SEM) in AMOS 21 program to test the hypotheses.

4. Result and discussion

4.1. Descriptive analysis. Questionnaires are distributed to 200 respondents, and 138 manageable questionnaires are left. The following countries of origin of managers are: 42 respondents came from Japan, 23 respondents from Taiwan, 34 respondents from South Korea, 18 respondents from Hong Kong and 21 respondents came from China. The majority of respondents (84 people or 60.9%) were female and the remaining were 54 men or 39.1%. Furthermore, position in company acquired the fact that of the total 138 respondents in research, the majority of respondents (133 persons or 96.4%) have a position in the company as an employee. 4 persons or 2.9% as a first-line managers and only 1 person or 0.7% serve as middle managers. Age level respondents obtained for the fact that of the total 138 respondents researched, the majority of respondents, 103 people or 74.6%, were aged 18-20 years, 21 people or 15.2% were aged 26-33 years, 10 people or 7.2% aged were 36-40 years and 4 people or 2.9% were aged 41-47 years.

4.2. Empirical analysis model testing (outer model). Outer model is a model that specifies the relationship among latent constructs and their indicators. In other words, it defines how each indicator is related with other latent construct, as it is described in Table 1.

Table 1. Outer model, discriminant validity and composite reliability

Variable	AVE	Composite realibility	Cronbach's Alpha
Technology transfer motive (TTM)	0.5496	0.8942	0.8616
The strength of the relationship (TSR)	0.5473	0.8933	0.8614
Mastery of manufacturing technology (MMT)	0.6363	0.8972	0.8568
Personal capacity of local employees (PCLE)	0.4580	0.8535	0.8007
Employees productivity (EP)	0.6003	0.8999	0.8664

Loading value from these indicators above fills the criteria as loading value > 0.5. It shows that these indicators have good convergent validity as its latent construct measurement. Composite reliability value of latent construct TSR as 0.8942, PCLW as 0.8933, TTM as 0.8972, EP as 0.835 and MMT as 0.899. Composite reliability value of latent constructs TSR, PCLW, TTM, EP and MMT is larger than 0.7 (> 0.7). It shows that the indicators have good internal consistency. Meanwhile, reliability testing is strengthened by Cronbach's Alpha value. Limit order for reliability testing and Cronbach's Alpha value is >0.7. Cronbach's Alpha value from latent construct TSR as 0.8616, PCLW as 0.8614, TTM as 0.8568, EP as 0.8007 and MMT as 0.8664.

4.3. Hypotheses testing (inner model). Testing on structural model aims to test the significant relationship among the influence of construct latent variables in the model. Significant relationship between the influence of latent construct is got from bootstrapping step procedure. Coefficient value (original sample) and significant value at t-statistics can be seen in Table 2.

Table 2. The coefficient values, standard deviation, standard error and t-statistics

	Original sample (O)	Standard deviation (STDEV)	Standard error (STERR)	t-statistics (|O/STERR|)	Decision
TTM -> TSR	0.6719	0.0472	0.0472	14.2464	H1 accepted
TTM -> MMT	0.3469	0.1036	0.1036	3.3492	H2 accepted
TTM-> (PCLE)	0.5615	0.0604	0.0604	9.2939	H3 accepted
TSR-> MMT	0.2322	0.1159	0.1159	2.003	H4 accepted
PCLE-> MMT	0.3465	0.0929	0.0929	3.731	H5 accepted
MMT-> EP	0.0489	0.1491	0.1491	0.3279	H6 rejected
TSR -> EP	0.2829	0.1412	0.1412	2.003	H7 accepted
PCLW -> EP	0.4048	0.1272	0.1272	3.1832	H8 accepted

The result of structural model test can also be seen by R^2 value in endogen constructs. Estimation criteria of R^2 value indicate that the model is "good" if R^2 value is 0.67, "moderate" if R^2 value is 0.33 and "weak" if R^2 value is 0.19. R^2 value is got from TSR construct as 0.4514 which can be interpreted that there is variation in construct TSR and it can be explained by TTM construct as 45.14% (0.04514 x 100%). R-square value in PCLE construct is 0.3513, means that variation in PCLE construct can be explained by MTT construct as 31.53% (0.3513 x 100%). R^2 value for PT construct as 0.6618 (66.18%) can be explained by TSR, MTT and PCLW construct. Meanwhile, R^2 value in PK construct as 0.4752 (47.52%) can be explained by TSR, MMT and PCLW constructs. Total R^2 value can be seen in Table 3 below.

Table 3. Value of R^2 value

Construct	R-square
TSR	0.4514
PCLE	0.3153
EP	0.472
MMT	0.6618

4.4. Goodness of Fit (GoF). The value of GoF index can be obtained by multiplied average communalities index in R^2 model. GoF value ranges between 0-1 with interpretation as follows: GoF value is considered as small in 0.1, moderate in 0.25, and large in 0.36. Complete results of GoF testing will be presented in Table 4 below.

Table 4. R^2 value, average R^2 value, communality and average communality

Endogen construct	R-square	$\overline{R^2}$	Communality	$\overline{Com}$
TSR	0.4514	0.4751	0.5496	0.5583
PCLE	0.3153		0.5473	
TTM	-		0.6363	
EP	0.472		0.458	
MMT	0.6618		0.6003	

GoF value is obtained as 0.5150 which means that this model is included in large GoF value criteria.

Conclusion

Technology transfer motive influences the strength of relationship, personal capacity of local employee and technology mastery. The strength of relationship and personal capacity of local employee also improves employee productivity. The results show that Eastern Asia managers have good willingness to transfer technology. It is proven by the positive influence on their relationship with local employee. It is also significantly proven by their relationship of personal capacity of local employee. It is in line with Argote and Ingram (2000). Other interesting point to be concerned in manufacturing industry in Indonesia is that Eastern Asia managers need to build verbal information network which is combined with broader decentralization (Edstrom and Galbraith, 2007). Transfer mechanism can be performed through personal movement, learning by doing, learning by observing, in-house or off-house training, replication and innovation, publication and presentation, employee interaction in team work, mentoring with experts/expatriate, and organizational alliance (Kao, 2006; Foss and Pedersem, 2002). It will impact on the development and production process that will show higher performance on the strength of relationship between managers and local employees.

We have not proven the relationship between technology mastery and employee productivity. Nonaka (1994) found contradictive results which said that technology mastery influences employee productivity. It becomes interesting to discuss the working relationship in manufacture industry in Indonesia, especially in non-manager position, performed via outsourcing network. Indonesia government in Act No. 13, 2003, article 64 stated that "an organization can give its working performance to be done by another organization via formal written memo of understanding". It is confirmed by Olsen (2006) who postulated that the effect of productivity goes along with technology transfer from the manager, yet, higher influence will be shown by service organization. It is in line with Görg (2008) and Houseman (2006).

Limitation

High correlation value of TSR and PCLE is compared with root value of AVE from TSR and PCLE constructs which showed that relationship model between PCLE and TSR is not performed on both variables.

Next research agenda

The relationship between PCLE and TSR constructs needs to be further analyzed to test the influence of both variables. Other contradictive variables are technology mastery and productivity.

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