The Effect of Authentic Leadership (AL) and Individual Innovation Adoption (IA) on Innovative Work Behavior (IWB) in Thai Context

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Abstract

The objective of this study was to examine the effect of Authentic Leadership (AL) on Innovative Work Behavior (IWB) with a consideration on the moderating effect of Innovation Adoption (IA) on that effect. Data analysis using structural equation modeling (SEM) supported the hypothesis that authentic leadership and innovation adoption had positive effects on innovative work behavior. However, the results did not demonstrate the moderating effect of innovation adoption but indicated the interrelated effect of innovation adoption and authentic leadership on innovative work behavior. The size of the corporation and corporate core values (such as creativity and innovation) might undermine the moderating effect of innovation adoption. Future research should study small or diverse business companies with and without innovation embedded in their corporate core values. The innovation adoption questionnaire should also be used in other sectors or countries to test the generality of the questionnaire.

Keywords: Innovation Adoption/ Authentic Leadership/ Innovative Work Behavior/ Moderating Effect/Structural Equation Modeling/ Private Thai Company

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Introduction

Innovation matters for development, as well as achieving national goals. Countries in the Organization for Economic Co-operation and Development (OECD) have adopted national roadmaps to foster innovation and enhance their economic impacts (OECD, 2012). To move beyond labor-intensive part production and assembly, firms in Thailand's manufacturing sector will need to strengthen collaborative innovation linkages (Koen, Asada, Rahuman, & Bogiatzis, 2018). The authenticity of a leader improved organizational performance, such as increasing productivity and saving unnecessary costs, by stimulating higher levels of engagement (Avolio, Gardner, Walumbwa, Luthans, & May, 2004), fostering business performance, and by developing innovative solutions to internal problems and marketing challenges (Avolio & Gardner, 2005). The fostering and monitoring of authentic behavior in organizations might also prevent unethical decisions and actions (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008).

In 2016, Thailand 4.0, a crucial new policy of the Thai government, was officially launched. It was a national roadmap designed to deal with the middle-income trap, and to transform Thailand into a high-income nation, all in five years. The plan to transform the current economy to a value-based economy emphasized three things: (1) Innovation, (2) Technology & Creativity, and (3) Trade in Services (AIT, 2016). The national roadmap movement impacted traditional small and medium enterprises (SMEs). It caused them to become smarter enterprises and startup businesses, which were more advantageous in many sectors of industry. The sectors in which this change was emphasized were food, agriculture and biotech, health/ wellness and bio-medical, digital/internet of Things (IoT) and embedded technology, and finally, a creative culture and high-value services. The national human capital development aimed to support the national policy to make Thailand's national workforce self-directed learners and active citizens that make in-depth contributions to society (AIT, 2016).

Furthermore, employees' innovative work behavior of engaging with new creative ideas, processes, procedures, and products (Farr & Ford, 1990) became one of the critical factors driving the efficiency of an organization. The more employees develop new ideas, the more they could generate solutions to problems (Farr & Ford, 1990). To encourage the employees to have more innovative work behavior, authentic leadership could be introduced, which would directly influence team members' creativity and team innovation (Černe, Jaklič, & Škerlavaj, 2013). The creative performance of employees was quite often dependent on leadership, as several conceptualizations and empirical studies have shown e.g. (Oke, Munshi, & Walumbwa, 2009; Oldham & Cummings, 1996; Scott & Bruce, 1994). Employees who had innovation accepting attitudes would benefit their businesses and had no limit to face critical issues like lack of new technology or novelty to compete in the market (Talukder, Harris, & Mapunda, 2008). In conclusion, the innovation adoption process depended on the individual and whether they would embrace new knowledge and the implementation of new innovations, processes, or products (Rogers, 1995). Therefore, this study aims to explore the effect of leadership style and innovation adoption on innovative work behavior of employees, in the Thai private sector.

Purposes of the Study

There are three main purposes of this study. Firstly, this study aims to ascertain the factors behind innovation adoption among Thai private sector employees. Secondly, this study intends to examine if a leadership style affects the innovative work behavior of Thai employees. Thirdly, the study will explore if innovation adoption has a direct and/or indirect effect on the innovative work behavior of employees.

The study will therefore provide empirical evidence for whether or not: (1) authentic leadership affects innovative work behavior, (2) innovation adoption affects innovative work behavior, and (3) innovation adoption moderates the effect of authentic leadership on innovative work behavior. In addition, the validation of the new tool for innovation adoption measurement, as well as those of the previous tools to measure authentic leadership and innovative work behaviors, will be verified. As a result of the study, the scales will be more reliable for future usages, particularly in private Thai organizations. Executives and HR personnel of organizations can apply the results as well to design intervention activities that help promote innovation work behaviors of employees.

Review of Related Literature

This section contains the reviews of related literature describing innovative work behavior (IWB), authentic leadership (AL), and innovation adoption (IA). It also provides the theories of authentic leadership and individual innovation adoption with consideration of their effects on innovative work behavior, which have led to the hypotheses and framework of this study.

Innovative Work Behavior (IWB)

Innovative Work Behavior (IWB) was an individual's behavior that aimed to achieve the initiation and introduction of new and useful ideas, processes, products, or procedures within a work role, group, or organization (Farr & Ford, 1990). Innovative Work Behavior (IWB) was a complex behavior mixed in with the generation of ideas, the introduction of ideas, and idea application (Scott & Bruce, 1994). The four dimensions of innovative work behavior (IWB) were summarized following Amornpipat (2016) study. *Opportunity exploration* referred to the behavior of seeking for opportunities to improve things like products, services, or work procedures (Basadur, 2004; Farr & Ford, 1990; Kanter, 1988). *Idea generation* was defined as the employee generated new concept, products, process, and approaches (Kanter, 1988). *Championing* mentioned the ideas that won everybody's hearts and everyone accepted the new ideas (Howell, Shea, & Higgins, 2005). *Implementation* was stated as a detailed action work plan a person must take to push out all the deliverables to develop a new idea or launch a new product (Kanter, 1988).

Authentic Leadership (AL)

Authentic leadership was a pattern of leader behavior that drew upon and promoted both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development' (Walumbwa et al. 2008, p. 94). From the main definition of AL as Walumbwa had shaded 4 dimensions concerned interest. *Self-awareness (SA)* referred to mindfulness expression and self-acceptance of their values, feelings, identity, and goals as well as understanding themselves. *Balanced processing (BP)* focused on using analytical thinking to ensure that information was factual and without bias before acting on it. *Internalized moral perspective (IM)* was described in the behavior of a good understanding of ethics, and expressed actions with honesty and truthfulness, and reflecting their values. *Relational Transparency (RT)* pointed in the open-minded characteristic and willing to provide any data, information, or related details directly, while being polite (Walumbwa et al., 2008). An additional dimension, *Harmony Relations (HR)* found by Amornpipat, in Thai context had been culturally focused on cultural knowledge usage, as well as the knowledge of their relationships to others with kindness and respectfulness towards other employees (Amornpipat, 2016).

Innovation Adoption (IA)

Innovation adoption was an individual process affected by user psychological characteristics, personal traits, and individual perceptions (Rogers & Shoemaker, 1971). It was referred to the generation of innovation that results in new outcomes to administrative people (Daft, 1978; Damanpour & Wischnevsky, 2006). The innovation adoption was also described as individual perceptions of the degree of novelty as a striking affective belief that impacts on the likelihood of technology acceptance (Wells, Campbell, Valacich, & Featherman, 2010). Talukder et al. (2008) found individual factor as one of the 3 adoption factors: organization, individual, and social. Based on their definition, the individual adoption composed of Perceived usefulness, Personal innovativeness, Prior experience, Image, and Enjoyment.

The Effect of Innovation Adoption and Authentic Leadership (AL) on Innovative Work Behavior (IWB)

The creative performance of employees was quite often dependent on leadership, based on many conceptualizations and empirical studies (Oke et al., 2009; Oldham & Cummings, 1996; Scott & Bruce, 1994). Leaders enhanced employees' innovative behaviors and created attitudes that were beneficial to innovative activities (Oke et al., 2009). AL had positive relationship with employees' creativity and innovativeness, the employees' creativity also had a positive impact on innovativeness (Müceldili, Turan, & Erdil, 2013). Also, the result finding of Amornpipat (2016) research confirmed that AL had positive effect on IWB of Thai Royal Military employees. Therefore, the first hypothesis is to reconfirm that the Authentic leadership (AL) has positive effect on innovative work behavior among Thai employees, working in private sector.

For the effect of Innovation Adoption (IA) on Innovative Work Behavior (IWB), there were some significant studies. Such as, Scott and Bruce (1994) found that new idea acceptation acted as a motivated stimulus that enabled innovative behavior. In fact, it was natural for employees to resist changes, except they would receive benefits (Ajzen, 1991). Moreover, the organizational situations and attitudes acted as motivative stimuli and intentions of employees (Le Bon & Merunka, 1998). So, the adoption would be successful when employees accepted and effectively used what they had adopted (Lee & Xia, 2006). In Talukder's study, he also emphasized that if employees did not have innovation accepting attitudes, the organization might face with business challenges because of the lack of new technology or any newness to compete in the market (Talukder et al., 2008). Therefore, the hypothesis 2 is stated as IA has positive effect on innovative work behavior (IWB).

The innovation-accepted decision belonged to the employee, not to an organization (Carayannis, Meissner, & Edelkina, 2017). The innovation acceptation of managers played a vital role on the link between leadership and innovative work behavior (McGuirk, Lenihan, & Hart, 2015). The firms which employed managers who participated in training were more likely to process innovation in terms of new ideas or behaviors that lead to significant improvements in the way work was carried out (McGuirk et al., 2015). Also, Talukder et al. (2008) suggested to further his study on the individual innovation adoption as a moderating effect in some other perspectives. Therefore, hypothesis 3 is coming up with Innovation adoption (IA) moderates the effect of authentic leadership (AL) on innovative work behavior (IWB). The Figure 1 demonstrates a conceptual framework portraying the 3 hypotheses.

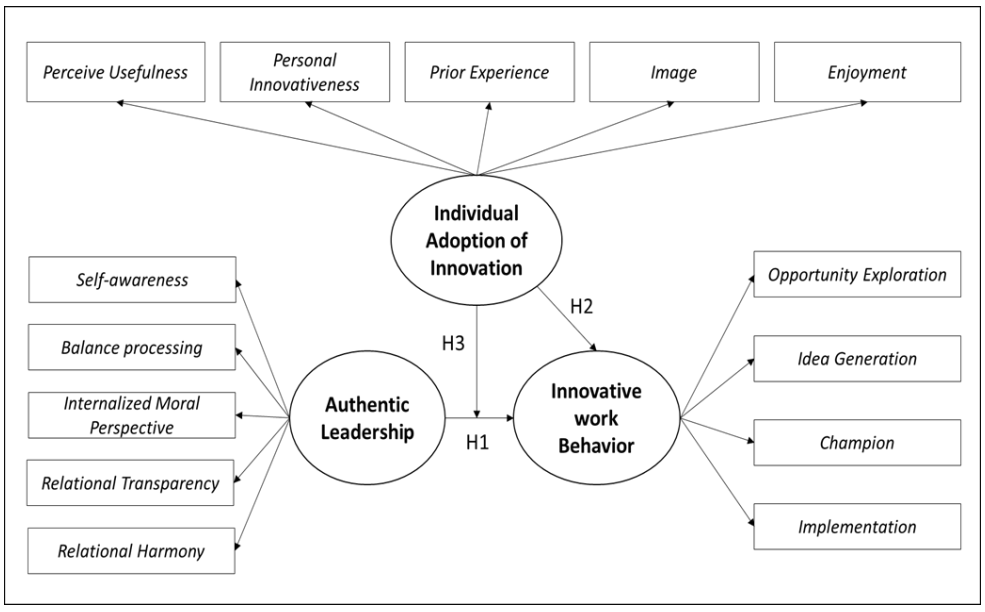

Figure 1 The conceptual framework of this study, portraying the three hypotheses and the factors of the variables: Authentic Leadership, Innovation Adoption, and Innovative Work Behavior

Research Methodology

Population and Sample

The scope of this study covers Thai employees of a Thai conglomerate in the agricultural and food industry. A pilot study was conducted for testing the quality of the questionnaires via factor analysis, at least 100 cases were required (Wongwanich & Wiratchai, 2003). So, the sample for the pilot study was estimated at around 200, who were not in the sample pool of the main study. According to Krejcie and Morgan's Table, if the population was about 25,000 employees, the appropriate number of samples would be around 379 (Krejcie & Morgan, 1970). However, this study had its focus on 1,000 samples to cover employees with various ages, positions, business functions, and years of service.

Data Collection

Due to the vast locations of the demography of participants characteristics, the online application was selected to distribute via pre-registration emails and personal social networks. The questionnaires were prepared in electronic form using google survey form application. All the answers were configured to mandatory fields, and the system would not accept if the participants did not complete the questionnaires. For pilot study, the 200 emails were sent out and some gentle reminding emails for non-response participants were resubmitted. Finally, the sample size of pilot study was 116. For the hypothesis testing study, the focus of 1,000 samples with differing gender, age, position, business functions, and years of service were proceeded the same method. In conclusion, 200 staff and managers were randomly selected as samples for 2-week pilot study to test the quality and reliability of the measurement tools, and 1,000 employees as samples for hypothesis testing.

Research Instrument

Questionnaires were used as an instrument to collect data in this study. The 3 questionnaires aimed to measure authentic leadership, innovative work behavior, and individual innovation adoption with self-administered questionnaires based on 5-point Likert's rating scale, from mostly agree to mostly disagree which were scored as 5 to 1, respectively. Also, demographic questionnaire was used to collect personal information about the participants, which included gender, age, position, business unit, service year, and level of education.

The Authentic Leadership (AL) questionnaire was adopted from Amornpipat (2016)'s study, based on Avolio, Gardner, and Walumbwa (2007)'s study, comprised of 5 factors, 6 items in each factor, as a total of 30 items. The Innovative Work Behavior (IWB) questionnaire was also adopted from Amornpipat (2016)'s study, based on the study of De Jong and Den Hartog (2008). It comprised of 10 items. The Individual Innovation Adoption (IA) questionnaire was newly developed and constructed with 25 items, based on the IA individual factor defined in the

confirmed the factors of each questionnaire: AL composed of 5 factors; Self-awareness (SA), Balanced processing (BP), Internalized moral perspective (IM), Relational Transparency (RT), and Harmony Relations (HR); IWB had factors including, Opportunity exploration (OE), Idea generation (IG), Championing(CP), and Implementation (IM); and the newly developed IA, Perceived Usefulness (PU), Past Experience (PE), Enjoyment (EJ), and Innovativeness (IN). Results also found the three questionnaires possessing good qualities of validities with appropriate item-total correlations (.3 < r <.8), significant discriminant t values, and high reliabilities (Cronbach's Alpha coefficients > 0.960). The final questionnaire package therefore consisted of 4 questionnaires with 60 item questions as following; (1) the demographic characteristics of the participants (6 categories), (2) authentic leadership measurement (29 items), (3) innovative work behavior measurement (10 items), and (4) innovation adoption measurement (21 items).

Data Analysis

The quantitative analysis used SPSS to perform descriptive statistics and scale analysis. The hypothesis was analyzed using path analysis via LISREL program.

Results

Descriptive Statistics of Participants

The majority of the respondents were female (59.57%), in the age category of 31-40 years old (42.71%), held bachelor's degrees (67.71%), were in staff positions (31.43%) and in section *manager* positions (29%), in the department of support units (60.29%), and in service less than 10 years (49.72%).

Scale analysis

The analyses of Authentic Leadership model, the Innovation Adoption model, and the innovative work behavior model were performed and found good quality, as the following details.

The Authentic Leadership model consisted of 5 factors, with 29 observed variables (questionnaire items). The study found that the standard factor loadings of observed variables were significant at the 0.01 level. Factor loadings ranged from 0.623-0.903, with standard errors of 0.043-0.165, test values (t-value) of 7.787-18.532 and squared multiple correlations (SMC) of 0.388-0.815. The second-order CFA performed on the authentic leadership model validation indicated good fit at construct reliability = 0.9820 and average variance extracted = 0.6542 between the conceptual model and the observed data. The standard factor loadings of observed variables and latent variables were significant at the 0.01 level.

Next is the Innovation Adoption model which consists of 4 factors and 21 observed variables. Data analysis has shown the factor loadings (λy), standard errors (SE λy), significant tests (t), and squared multiple correlations (SMC). The results showed that the standard factor loadings of observed variables were significant at the 0.01 level. Factor loadings ranged from 0.682-0.912, with standard errors of 0.097-0.155, statistics tests (t-value) of 9.424-14.985 and squared multiple correlations (SMC) of 0.465-0.832. The second-order CFA performed on the innovation adoption model indicated good fit at construct reliability (ρ_c = 0.9767) and average variance extracted (ρ_v) = 0.6676 between the conceptual model and the observed data. The standard factor loadings of each observed variable and latent variables were significant at the 0.01 level.

Then, the innovative work behavior model consists of 4 factors and 10 observed variables. Data analysis revealed the factor loadings (λy), standard errors (SE λy), significant tests (t), and squared multiple correlations (SMC). The results were significant at the 0.01 level. Factor loadings ranged from 0.803 - 0.907, with standard errors of 0.030 - 0.044, statistics test values (t-value) of 22.454 - 32.801 and squared multiple correlations (SMC) of 0.645 - 0.823. The second order CFA for the innovative work behavior constructed model validation also indicated good fit at Construct reliability (ρ_c) = 0.9672 and average variance extracted (ρ_v) = 0.7471 between the conceptual model and the observed data with goodness of fit statistics and support the four latent variable structure.

Hypothesis Testing

There are 3 hypotheses to be proved in this study, as stated below:

Hypothesis 1: Authentic leadership (AL) has positive effect on innovative work behavior (IWB).

Hypothesis 2: Innovation adoption (IA) has positive effect on innovative work behavior (IWB).

Hypothesis 3: Innovation adoption (IA) moderates the effect of authentic leadership (AL) on innovative work behavior (IWB).

Testing hypothesis 1: Stepwise multiple regression analysis was used to analyze the predictive power on innovative work behavior (IWB) by authentic leadership (AL) as a whole and also by its 5 factors: Self-awareness (ALSA), Balanced Processing (ALBP), Relational Transparency (ALRT), Internalized Moral Perspective (ALIM) and Relational Harmony (ALRH). Results revealed that the predictive power of AL was 50.9%, of which ALBP factor had the most power prediction (48.4%)., The results indicated the significant positive effect of Al on IWB. Therefore, hypothesis 1 was supported.

Testing hypothesis 2:The stepwise multiple regression analysis was also used to analyze predictive power on innovative work behavior (IWB) by innovation adoption (IA) and by its 4 factors: Perception of Usefulness (IAPU), Past Experiences (IAPE), Enjoyment (IAEJ) and Employee Innovativeness (IAIN). Results indicated that the predictive power (R^2) of overall IA on IWB was 56.5%. of which the IAPU factor had the most power (37.4%), therefore, hypothesis 2 was supported.

Lastly, using path analysis to examine the path coefficients, direct effects, indirect effects, and total effects from the exogenous variables (AL or IA) to the endogenous variables (IWB). The results of the causal (initial) model showed that the observed exogenous variables had Authentic Leadership (AL) as well as Innovation Adoption (IA), each was single latent variable. Al composed of five observed variables or factors and (IA) composed of four observed variables or factors. Path coefficients, direct effects, indirect effects, and total effect from the cause variables to the effect variables (Initial Model) were significantly at the 0.01 level. The direct effects and total effect onto IWB of AL were equal to .382 and .750, whereas the direct effect of IA was equal to .498 (as shown in Table 1). Results of the structural equation modeling (SEM) for the causal model of Authentic Leadership and Innovation Adoption influencing Innovative Work Behavior indicated congruence between the conceptual model and the empirical data with goodness of fit statistics (as shown in figure 2.) Therefore, the results confirmed the support to hypothesis 1 and 2.

Table 1 Path coefficients, direct effects, indirect effects, and total effect from the cause variables to the effect variables (Initial Model)

Cause Variables	**Effect Variables**					
	Innovation Adoption (IA)			**Innovative Work Behavior (IWB)**		
	DE	**IE**	**TE**	**DE**	**IE**	**TE**
Authentic Leadership (AL)	0.738**	-	0.738**	0.382**	0.368**	0.750**
Innovation Adoption (IA)				0.498**	-	0.498**
Squared Multiple Correlations for Structural Equations	**0.545**			**0.675**		

** Significant at the 0.01 level

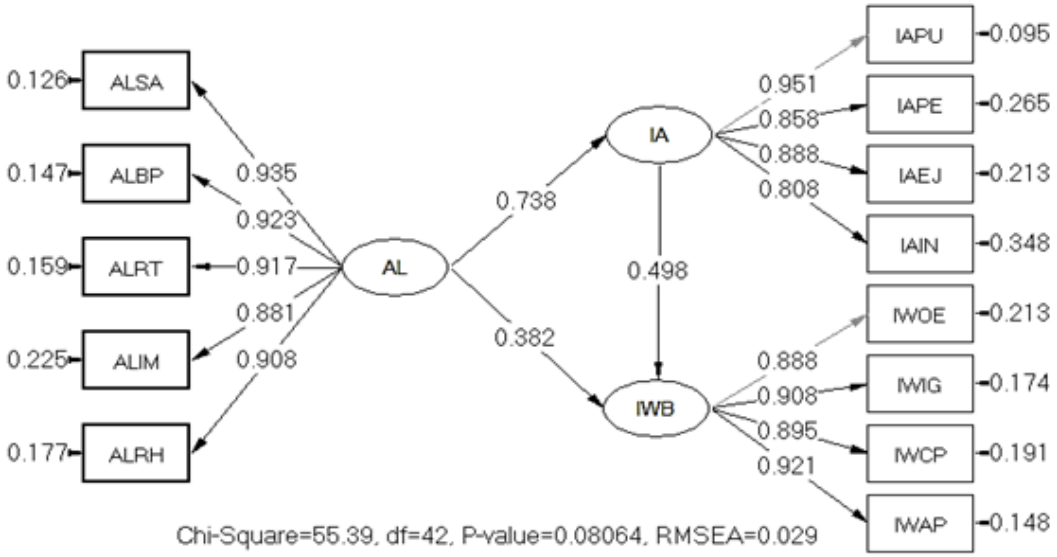

Figure 2 Causal model of authentic leadership (AL) and innovation adoption (IA) influencing innovative work behavior (IWB) (Empirical Data)

Testing hypothesis 3: To test the moderating effect of IA (Innovation Adoption) on the effect of AL (Authentic Leadership) on IWB (Innovative Work Behavior), the interaction model of AL x IA (as depicted in Figure 3) was computed and compared with the initial model.

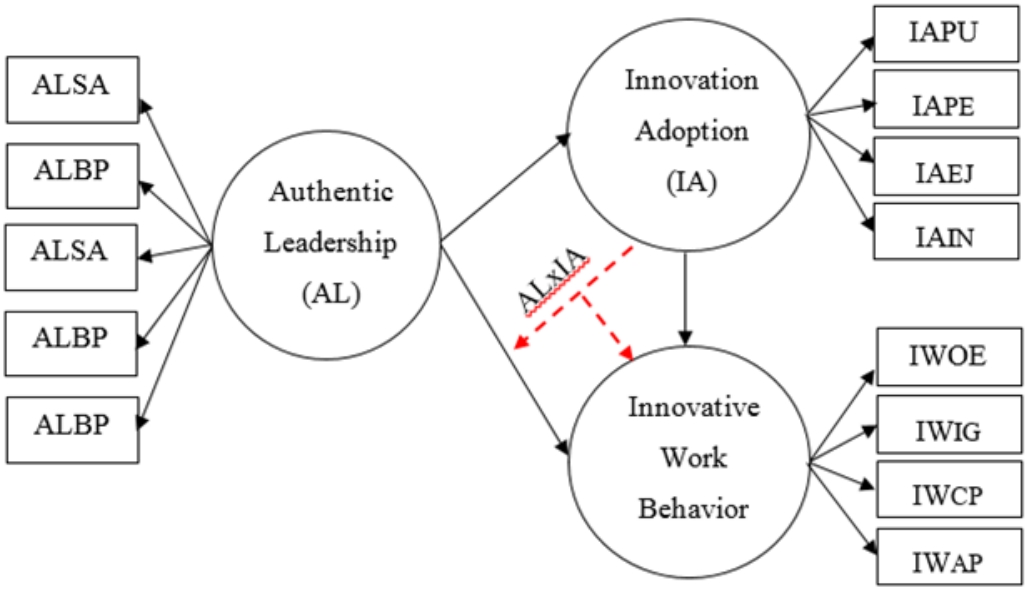

Figure 3 *Hypothesis model of innovation adoption (IA) moderates the effect of authentic leadership (AL) on innovative work behavior (IWB).*

Results on the comparison of the initial model and moderation model showed path coefficients, direct effects, indirect effects, and total effect from the cause variables to the effect variables (Moderation Model) were significantly at the 0.01 level. The direct effects and total effect onto IWB of AL were equal to .334 and .707, whereas the direct effect of IA was equal to .572 (as shown in Table 2). The direct effect of AL x IA was not significant (.091, p>>05). In addition, the results, as demonstrated in Table 2, showed that the SMC for structure equations (.646) were not much different from that found in the initial model (.675) So, no further analysis could be performed. Therefore, the result did not support the moderating effect of Innovation adoption on the effect of authentic leadership on innovative work behavior as stated in hypothesis 3.

Table 2 Path coefficients, direct effects, indirect effects, and total effect from the cause variables to the effect variables (Moderation Model)

Cause Variables	**Effect Variables**					
	Innovation Adoption (IA)			**Innovative Work Behavior (IWB)**		
	DE	**IE**	**TE**	**DE**	**IE**	**TE**
Authentic Leadership (AL)	0.708**	-	0.708**	0.334**	0.373**	0.707**
AL×IA				0.091	-	0.091
Innovation Adoption (IA)				0.527**	-	0.527**
Squared Multiple Correlations for Structural Equations	**0.502**			**0.646**		

** Significant at the 0.01 level

Discussion

There are three main purposes of this study. Firstly, this study aims to ascertain the factors behind innovation adoption among Thai private sector employees. Secondly, this study intends to examine if a leadership style affects the innovative work behavior of Thai employees. Thirdly, the study will explore if innovation adoption has a direct and/or indirect effect on the innovative work behavior of employees.

The results reported above have provided answers to the 3 questions indicating in the purpose of the study. First, the result from scale analysis determined the factors behind innovation adoption of Thai private sector employees, as including; (1) perceive usefulness (PU), (2) prior experience (PE), (3) innovativeness (IN), and (4) enjoyment (EN). CFA performed on the innovation adoption model indicated good fit at construct validity. The standard factor loadings of each observed variable and latent variables were significant. This finding found support to the definition and study of Talukder and others (2008) on individual factor which was one of the 3 adoption factors: organization, individual, and social.

Second, data analysis from both regression and path analysis resulted supports to hypothesis 1, as AL had significant positive effect on IWB. The result indicated that this leadership style helps to increase innovative work behavior of Thai employees. As the creative performance of employees was quite often dependent on leadership (i.e., Oke et al., 2009; Oldham & Cummings, 1996; Scott and Bruce, 1994), leaders could enhance employees' innovative behaviors and created attitudes that were beneficial to innovative activities (Oke et al., 2009). So, the authentic leadership had a positive relationship with employees' creativity and innovativeness and employees' creativity also has a positive impact on innovativeness (Müceldili et al., 2013). In the Thai context, this finding confirms and advances the study of Amornpipat (2016) that authentic leadership has a positive effect to innovative work behavior, no matter in the public sector (Royal Thai Military) or in the private sector (an agricultural & food industry).

Moreover, data analysis from both regression and path analysis resulted supports to hypothesis 2, as IA had significant positive effect on IWB. The outcome of this study as a leading product was the individual innovation adoption measurement tool, which was reliable and valid for further study expansion. The IA tool was developed and constructed in the Thai context to assess which referenced factors of Thai employees bought-in or accept the innovation in the organization, due to the new idea acceptation would act as a motivating stimulus that enables innovative behavior. (Scott & Bruce, 1994). In nature, employees might resist the changes, but if they received benefits from those changes, they would cooperate (Ajzen, 1991). Even though the organizational situations and attitudes influenced the motivation and intentions of employees (Le Bon & Merunka, 1998), the adoption would be successful when employees accept and effectively used what they had adopted (Lee & Xia, 2006). Therefore, employees who had innovation accepting attitudes, the business challenges towards new technology or any newness could have more advantages to compete in the market (Talukder et al., 2008). However, the individual employee owned innovation-accepted decision, not to an organization (Carayannis, Meissner, & Edelkina, 2017). Especially, managers, the innovation acceptation driver, would play an important role in the link between leadership and innovative work behavior (McGuirk et al., 2015). The firms which employed managers who contributed in training were more likely to process innovation in terms of new ideas or behaviors that leaded to significant improvements in the way work was carried out (McGuirk et al., 2015).

Third, to explore the moderating effect of individual innovation adoption on the effect of authentic leadership on innovative work behavior, the results from the path analysis were analyzed within 2 steps. In the first step, the result demonstrated that AL has positive effect to IWB. This confirms support to Hypothesis 1. In the same step, it also showed that IA displayed significant direct effect on IWB. This finding support Hypothesis 2 that IA had direct positive effect on IWB. In the second step, the results from path analysis further demonstrated that the squared multiple correlations (SMC) of the moderation model was not much different from that found

in the initial model. Therefore, the result did not support hypothesis 3. As many views of the empirical studies, this study intended to prove the authentic leadership and the innovation adoption could be powered up in the Thai environment as in the mentioned scope. Though the study did not demonstrate the moderating effect on innovative work behavior, it demonstrated an interrelated effect instead. After the results came out, the post-investigation was conducted and found additional document data. The major circumstantial evidence was the corporate culture, which embedded the core value of "innovativeness" into an employee's work life. The employees all easily accepted the new things the organization had introduced. The company engagement questionnaire in 2018 collected by the HR internal department indicated that 80 % of employees' respondents replied that they satisfied with the new innovations that the company introduced to them for more than 5 years. Therefore, the feeling stage of innovation adoption in the company employees might not have significantly affected the innovative work behavior. This incident was relevant to the article titled, "Barriers to Adopting Technology," published in the journal of Educause Quarterly, number 2, 2002. Butler and Sellbom (2002) stated that "The rate of adoption usually starts low, accelerates until about 50% of the community has adopted the technology, then decelerates, eventually approaching zero, as nearly everyone in the community has adopted the technology."

Recommendations

Recommendations for Practice

The innovation adoption measurement tool, a newly developed one, can apply with various categories of the employee in order to questionnaire the degree of acceptance in new technology, product, and process, introducing into their new operations, such as a robot, IoT, etc. Each factor result reflects the preferences of each person to decide to adopt an innovation or not adopt. The holistic view of the employees to adopt innovation can drive the company to have better strategic planning, such as how the company designs a benefit and reward package for a new idea or new product that is a benefit to the organization. Innovation that introduced in the company might be resisted, but if the company can select the employee who has past or related experience with a perceived usefulness person to handle the new project, then that innovation might be finally victorious.

The authentic leadership assessment had been conducted and found with high validity and reliability in both the Thai public sector and private sector, any programs for employee development, such as new leader preparation class, or individual development plan, the AL tool could provide the weakness and strength of leaders' trait so that the career development can be planned to manage pieces of training or programs accordingly. The organization can also conduct the authentic leadership assessment with the managers to see the holistic view of the leadership competency of the company and make a decision for any enhancement and encourage the employees to have better competition with other business competitors.

The innovative work behavior assessment tool, can be used with high validity and reliability in both the Thai public sector and private sector to measure and compare the level of innovativeness in different employee groups that might boost up the initiative of new ideas for corporate innovation programs and activities.

Recommendations for Future Research

The individual innovation adoption questionnaire should be tested for generality in other industrial sectors, other countries, or to compare IA across cultures. Since the individual innovation adoption was just one part of Talukder's innovation adoption study, future research can explore the innovation adoption on the whole 3 parts including organization, social and individual, in order to explore the effect of innovation adoption in more details.

References

AIT. (2016, 4 September 2016). *Thailand 4.0 will focus on investing on people: Minister Suvit Maesincee*. Retrieved from https://www.ait.ac.th/2016/09/thailand-4-0-will-focus-on-investing-on-people-minister-suvit-maesincee/

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Amornpipat, I. (2016). *The Development of Authentic Leadership Measure and Its Validation on Follower's Wellbeing and Innovative Work Behaviour in The Thai Context.* (Doctor of Philosophy). National Institute of Development Administration, National Institute of Development Administration.

Avolio, B. J., & Gardner, W. L. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. *The leadership quarterly, 16*(3), 315-338.

Avolio, B. J., Gardner, W. L., & Walumbwa, F. O. (2007). Authentic leadership questionnaire. *Retrieved February, 2*, 2009.

Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviors. *The leadership quarterly, 15*(6), 801-823.

Basadur, M. (2004). Leading others to think innovatively together: Creative leadership. *The leadership quarterly, 15*(1), 103-121.

Butler, D. L., & Sellbom, M. (2002). Barriers to adopting technology. *Educause Quarterly, 2*(1), 22-28.

Carayannis, E. G., Meissner, D., & Edelkina, A. (2017). Targeted innovation policy and practice intelligence (TIP2E): concepts and implications for theory, policy and practice. *The Journal of Technology Transfer, 42*(3), 460-484.

Černe, M., Jaklič, M., & Škerlavaj, M. (2013). Authentic leadership, creativity, and innovation: A multilevel perspective. *Leadership, 9*(1), 63-85.

Daft, R. L. (1978). A dual-core model of organizational innovation. *Academy of management Journal, 21*(2), 193-210.

Damanpour, F., & Wischnevsky, J. D. (2006). Research on innovation in organizations: Distinguishing innovation-generating from innovation-adopting organizations. *Journal of engineering and technology management, 23*(4), 269-291.

De Jong, J. P., & Den Hartog, D. N. (2008). Innovative work behavior: Measurement and validation. *EIM Business and Policy Research*, 1-27.

Farr, J. L., & Ford, C. M. (1990). Individual innovation.

Howell, J. M., Shea, C. M., & Higgins, C. A. (2005). Champions of product innovations: defining, developing, and validating a measure of champion behavior. *Journal of business venturing, 20*(5), 641-661.

Kanter, R. M. (1988). Three tiers for innovation research. *Communication Research, 15*(5), 509-523.

Koen, V., Asada, H., Rahuman, M. R. H., & Bogiatzis, A. (2018). Boosting productivity and living standards in Thailand.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement, 30*(3), 607-610.

Le Bon, J., & Merunka, D. (1998). The role of attitude in competitive intelligence activities of salespersons: evidence and consequences of the mediating effect. *ISBM report, 22*.

Lee, G., & Xia, W. (2006). Organizational size and IT innovation adoption: A meta-analysis. *Information & management, 43*(8), 975-985.

McGuirk, H., Lenihan, H., & Hart, M. (2015). Measuring the impact of innovative human capital on small firms' propensity to innovate. *Research Policy, 44*(4), 965-976.

Müceldili, B., Turan, H., & Erdil, O. (2013). The influence of authentic leadership on creativity and innovativeness. *Procedia-Social and Behavioral Sciences, 99*, 673-681.

OECD. (2012). *Innovation for Development*. Retrieved from https://www.oecd.org/innovation/inno/50586251.pdf

Oke, A., Munshi, N., & Walumbwa, F. O. (2009). The influence of leadership on innovation processes and activities. *Organizational Dynamics, 38*(1), 64-72.

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of management Journal, 39*(3), 607-634.

Rogers, E. M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. In *Die diffusion von innovationen in der telekommunikation* (pp. 25-38): Springer.

Rogers, E. M., & Shoemaker, F. F. (1971). Communication of Innovations. A Cross-Cultural Approach.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of management Journal, 37*(3), 580-607.

Talukder, M., Harris, H., & Mapunda, G. (2008). Adoption of innovations by individuals within organizations: An Australian study. *Asia Pacific Management Review, 13*(2), 463-480.

Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S., & Peterson, S. J. (2008). Authentic leadership: Development and validation of a theory-based measure. *Journal of management, 34*(1), 89-126. . Chulalongkorn University.

Wells, J. D., Campbell, D. E., Valacich, J. S., & Featherman, M. (2010). The effect of perceived novelty on the adoption of information technology innovations: a risk/reward perspective. *Decision sciences, 41*(4), 813-843.

Wongwanich, S., & Wiratchai, N. (2003). *Guidelines for Thesis Consultant*: Research and Educational Psychology Department, Faculty of Education. Chulalongkorn University.