iWorker: Development and Effectiveness

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Abstract

The objectives of this research were to study 1) digital competencies, work values and motivation factors; 2) adaptive capability; and 3) an approach to developing intelligent workers in order to enhance work effectiveness. The research used a mixed research method based on the exploratory sequential design for both qualitative and quantitative approaches. The qualitative approach is conducted using in-depth interviews with six top executives, three of whom were from S-Curve industries and the other three were from New S-Curve industries. Focus-group discussions were also conducted with nine persons: supervisors and employees from the human resources department of S-Curve and New S-Curve industries. The quantitative approach was conducted using questionnaires to collect data from a sample of 374 operative employees in the S-Curve and New S-Curve industries. The research tools consisted of a focus-group discussion guideline, a semi-structured interview form and a questionnaire. The reliability of the questionnaire was assessed by Cronbach's Alpha obtaining the coefficient of 0.939 (α = 0.939). The statistical devices used for the data analysis include descriptive statistics, Factor Analysis (FA), and Structural Equation Modeling (SEM).

The results showed that factors including the digital competencies of intelligent workers, computer knowledge and skills, especially, the accessibility and awareness of digital applications, digital media and online working, the ability to analyze data for operations and problem-solving, timely access to accurate information were contributed to their work effectiveness. For the work values, they emphasized extrinsic work values consisting of job security, compensation and benefits. For the motivation factors, they emphasized recognition, the work itself, job security, compensation, work-life balance and advancement. For the adaptive capability, teamwork and organizational culture were shown to be the factors that lead to their adaptive ability.

Results from the SEM models showed that each factor affecting work effectiveness is valid and statistically fit the empirical data at the 0.05 significant level. The results revealed that the motivation factors had a direct effect with the coefficient of 0.340, and the adaptive capability had an effect with the coefficient of 0.541. These two factors combined could predict 69 percent of work effectiveness. Work values had an indirect effect on work effectiveness via motivation factors with the coefficient of 0.316. Besides, digital competencies had an indirect effect on work effectiveness via the adaptive capability with the coefficient of 0.202. Therefore, a guideline to develop intelligent workers to create work effectiveness should focus mainly on enhancing digital competencies which consist of information technology knowledge and both soft and hard skills employing knowledge exchange with experience and teamwork, and use motivation factors as tools for developing digital competencies and adaptive capability for work effectiveness.

Keywords: iWorker, Digital Competency, Work Value, Motivation Factor, Adaptive Capability, Effectiveness

Introduction

Technology is playing an increasingly significant role in both the society and the economy. Digital tools and media can support all kinds of lifestyles and change ways of work, education, communication and access to information. The trends of the progress and development of information technology have an increasing impact on each organization causing changes in business activities and adjustments of the human resources to be compatible with the new-world economy. The advent of the social media technology has resulted in a higher growth of online activities. This is combined with the telephone technology that enables telephones to compete with laptop

computers. Telephone and Internet network coverage helps increase the amount and speed of distributed information. The convenience and accessibility of information have had a great impact on people's behavior and have enabled them to work 24/7. This has resulted in changes in employees' work patterns and needs. Employees with skills in both professional operation and information technology are in great demands to serve the growth of business and innovation.

Intelligent Workers (iWorkers) is a term used to refer to workers with high and reliable professional skills who work fast, access accurate information, use all the necessary data to respond to the needs of business and clients, employ technology in the operation, select data from countless data silos and share them (Letter, 2013). These workers can operate via the Internet connection using smartphones and social media to enhance their work effectiveness and achieve organizational goals (Porteous & Simons, 2020). They comprise a new type of employees who work on digital platforms (Merab, 2020). Leading companies in Europe refer to them as iWorkers who have the skills and the ability to access necessary data at all times in order to meet the demands of the business and clients and who are reliable as a workforce. The number of iWorkers in Europe has soared dramatically, with a 37-percent rise in 2018. iWorkers are key in the realization of business growth due to the use of innovation and technology to enhance the efficiency of the business process, resulting in higher business agility and better customer services (Vanner, 2013).

Previous studies have not yet included an insight into the situation in Thailand. The researcher, therefore, proposes to fill this gap by studying iWorkers in terms of their digital competencies, work values, motivation factors, adaptive capability and work effectiveness in order to provide a guideline for the development of organizations' personnel into iWorkers.

Literature Review and Related Research Studies

Concepts of Digital Competency

Digital competency is a basis of digital literacy. It is related to the use of information technology for work, which includes retrieving, accessing, storing, presenting, exchanging and communicating data and cooperating through Internet networks (Ala-Mutka, 2011). The competency framework serves as a reference for specifying the knowledge, skills and attitudes regarding digital competency required to support the learning and working of people of all ages through assessing their understanding of and skills in digital technology, including the knowledge of and skills in the use of technological tools from the basic to advanced levels, the ability to apply the knowledge and skills in digital settings and the attitudes relating to the application of the knowledge and skills. Attitudes indicate the thoughts and motivations of workers in digital settings and influence their performance and activities. Ala-Mutka (2011) reports that attitude is regarded as an important aspect of the execution of skills such as key information skills, self-study skills, social media literacy and professional ethics. Moreover, competency is a characteristic that correlates positively to an individual's efficiency (Mitrani et al., 1992; Spencer & Spencer, 1993). Technological advances and environments force humans to adjust and develop into human resources in the world of a new economy driven by innovations that aim to increase the value of productivity (Prensky, 2001). The competency development of information technology (IT) personnel should promote their ability to learn skills related to the correct usage of IT, the use of various types of technology to search for information, approaches to quality data analyses based on many existing data sources and the use of tools to facilitate cooperation in various settings (OECD, 2014). This study surveys the

perceived digital competencies based on the understanding of and skills in digital technology. The criteria employed in this study have been adapted from Thailand Professional Qualification Institute (Public Organization)'s criteria for digital competency assessment to find out about workers' perceived competencies in five areas: 1) The accessibility and awareness of digital applications; 2) The skills in using digital technology; 3) Online cooperation; 4) Digital media; and 5) Data analysis. It is hypothesized that iWorkers' motivation factors have a positive effect on their digital competencies (H3), that iWorkers' digital competencies correlate to their adaptability (H5), and that iWorkers' digital competencies correlate to their work effectiveness (H10).

Concepts of Work Values

The term "work values" refers to a person's belief in the expected outcome of his work. It is an intrinsic force driving the person to set a professional goal and direction. Work values can be categorized into two groups: 1) Intrinsic Work Values which put emphasis on work contents such as the challenging qualities of work, skills and ability required to achieve success, responsibility and independence and possibility for self-advancement; and 2) Extrinsic Work Values which go beyond the work contents such as the relation between work and money, the emphasis on the environments beyond the work itself, the emphasis on reasons in terms of financial compensation and job security that make people work in return for wages, benefits and job security. Mankoff (1974) shows that work values play a vital role in employees' emotional response and, consequently, have a direct effect on work motivation, satisfaction and effectiveness (Zytowski, 1994; Dawis, 2002). An understanding of the employees' work values, therefore, is helpful for designing approaches to make the employees behave in ways desired by their organizations, which will lead to work effectiveness, good work results and adaptability (Ros et al., 1999). From studying viewpoints on Intrinsic and Extrinsic Work Values, the researcher proposes a hypothesis that iWorkers' work values have a positive effect on their work motivation factors (H4), that iWorkers' work values have a positive effect on their digital competencies (H7), that iWorkers' work values have a positive effect on their adaptive capability (H8), and that iWorkers' work values have a positive effect on their work effectiveness (H9).

Concepts of Work Motivations

In the study of iWorkers' work motivation factors, Frederick Herzberg's Two Factor Theory (Herzberg et al., 1959) has been applied. The theory expounds factors affecting the personnel's work in an organization and divides the factors into two main groups: 1) Satisfaction; and 2) Dissatisfaction. Satisfaction, or Intrinsic Motivation, is influenced by Motivation Factors that drive a person to produce better work and to derive more satisfaction from work. It has a positive and sustainable effect on the operation of a worker (Yusoff & Kian, 2013). Dissatisfaction is Extrinsic Motivation. Staff's dissatisfaction at work can be prevented using Hygiene Factor, which refers to a factor that makes a worker happy. Without it, the worker will be dissatisfied and unable to increase their productivity. London (2009) projects that Extrinsic Motivation correlates with performance evaluation, particularly monetary compensation that significantly influences a worker's decision to work for an organization. This is in accordance with the projection of Aworemi et al. (2011) that extrinsic factors such as wages and compensation should be emphasized first. It also corresponds to Shea (2012) that points out that the Generation-Y employees must be motivated by extrinsic motivation factors such as compensation. However, this projection is different from that of Bumpenboon & Jirayuth (2016) who discuss that Generation-Y employees consider good work environments as a more efficient factor than remunerations. Work environments also affect employees' adaptability (Arkoff, 1968). Several scholars have shown that motivation factors such as

recognition, professional advancement, work characteristics and work-life balance affect employees' work effectiveness (Herzberg et al., 1959; Leahy et al., 2011; Aguenza & Mat Som, 2012). The researcher hypothesizes that iWorkers' motivation factors affect their work effectiveness (H1), that iWorkers' motivation factors affect their adaptive capability (H2), and that iWorkers' motivation factors are positively correlated to their digital competencies (H3).

Adaptive Capability

Rensch (1960) defines adaptive capability as a person's ability to adapt well to the external world, to reach the highest level of satisfaction, to behave appropriately according to social conditions and to face and accept the reality of life. Adaptive capability, therefore, refers to the readiness to accept and support new changes that will benefit one's organization, to adjust oneself and one's methods of work to accord changing circumstances while continually maintaining the efficiency of work. Technological progress enables humans to be adaptive. An increasing use of technology at work affects the operation of the organization's personnel and requires the personnel to make adjustment. Factors affecting the workers' adaptability include personal factors, operational factors, technological factors, and factors concerning the organizational culture. These factors also affect work effectiveness. Prentice & King (2013) show in their study that employees' adaptability has a positive effect on their work at a significant level. Similarly, Cullen et al. (2014) conclude that employees' adaptability affects their work satisfaction and helps improve their work efficiency. Sony & Mekoth (2016) also report that employees' adaptability has a positive effect on their efficiency. In this study, factors employed to assess the employees' adaptive capability are organizational culture factors, operational factors and technological factors. It is hypothesized that iWorkers' adaptive capability has a positive effect on their work effectiveness (H6).

Concepts of Work Effectiveness

Effectiveness is crucial for administration. Effectiveness means succeeding in working to reach the organization's goals. It can be viewed at two levels: 1) Individual Effectiveness which refers to the characteristics of a person who can achieve success at work or in any other activity; and 2) Organizational Effectiveness which focuses on the overall operational outcome of an organization. In this study, the researcher investigates Individual Effectiveness and focuses on individuals' operations as assigned according to their positions in their organizations. Factors affecting work effectiveness at the individual level are ability, skills, knowledge, attitude, motivation, and stress. Previous studies indicate that there are various factors affecting work effectiveness such as work characteristics, supervision, good relations with co-workers, freedom of expression, teamwork and career advancement (Mafini & Pooe, 2013; Sibhoko, 2017).

According to the literature review, a study framework to find a guideline to develop employees into iWorkers in order to increase work effectiveness can be illustrated as in Figure 1.

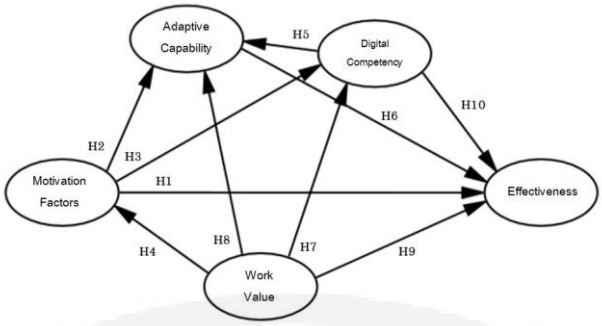

Figure 1 Study Framework for the Development of Employees into iWorkers to Increase Work Effectiveness

Research Objectives

This study has 3 main objectives: 1) To study iWorkers' digital competencies, work values, and motivation factors; 2) To study iWorkers' adaptive capability; and 3) to provide a guideline to develop workers into iWorkers to enhance work effectiveness.

Methodology and Instruments

Research Design and Scope

This study employs a mixed research method based on the exploratory sequential design which mainly makes use of the qualitative research methodology through interviews with 6 high-ranking executives – 3 from S-Curve industries and 3 from New S-Curve industries – and focus-group discussions with 9 delegates representing operation heads and human resource personnel of S-Curve and New S-Curve industries. The quantitative research methodology is employed to verify and analyze the data. It consists of surveying opinions of operation-level employees in S-Curve and New S-Curve industries in Bangkok and its neighboring provinces. The opinions and perceptions of the workers are assessed using a five-level rating scale. The sample group, calculated using the Cochran formula (Cochran, 1977) and conforming to the criterion of Hair et al. (2010) that suggests that a suitable sample size for an SEM analysis should be larger than 100 samples, comprises 384 employees. During the data collection, the researcher distributed 400 questionnaires to the sample group, 274 of which (93.50%) were returned.

Study Limitations 1) No previous work has been done on iWorkers. However, according to the definition provided by Letter (2013), iWorkers are workers with high work skills especially in technology. The sample group in this study, therefore, comprises employees from S-Curve and New S-Curve factories who represent iWorkers. These industries include companies that embrace changes and those that emphasize man-machine cooperation. These companies introduce new technologies in their organizations to modify and develop their products and business models. Their personnel are invariably highly skilled; 2) The assessment of the iWorkers' work effectiveness is based on the survey of their opinions on their perceived work effectiveness.

Research Instruments comprise a guideline for group discussions, a semi-structured interview form and a questionnaire. The reliability of the questionnaire, assessed by Cronbach's Alpha, obtains the coefficient of 0.939.

Data Analysis

1. For the qualitative data analysis, the data using the method of content synthesis was analyzed and processed.

2. For the quantitative data analysis, the instruments were 1) Descriptive Statistics; and 2) Factor Analysis. In the component analysis, the following processes are conducted: Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM).

Results

From the interviews and group discussions, iWorkers could be defined as a group of people who possessed knowledge of work and high and reliable work skills using information technology. They also worked fast and accurately through accessing and using necessary information to respond to the needs of business and clients. These iWorkers focused on work efficiency, adapted well to changes, liked to study to increase their knowledge, had the ability to adjust their work to changing circumstances and regularly followed the progress of technology. In addition, the study's key informants opine that the factors affecting iWorkers' work effectiveness were digital competencies, work values, motivation factors and adaptive capability with the following details:

1. iWorkers' digital competencies included IT skills, basic computer skills such as the ability to use basic application software, email and the Internet, and the ability to make data analyses for planning and problem solving.

2. iWorkers' work values made them focus on self-development and make the most of opportunities provided for them.

3. iWorkers' work motivation factors referred to opportunities for career advancement through further education or additional trainings which were effective motivations as these iWorkers were usually determined to improve themselves. The recognition from co-workers and supervisors and rewards, both monetary and non-monetary, can serve as effective work motivations.

4. iWorkers' adaptive capability enabled them to learn and adjust to the use of new technologies or work processes in their organizations and to adapt to situations, teamworking and organizational culture and contributes to their work effectiveness.

Those four factors were used to design a questionnaire to survey opinions of the sample group representing iWorkers, the results of which are divided into two parts as follows:

1. General Information and Behavior of Using Technology: 53.7% of the sample group were male, and 46.3% were female. 68.2% were born during the years 1981-1995. 41.2% worked in Information Technology Department. 35.0% used at least two IT devices simultaneously for work. 31.8% mainly used their laptop computers, and 30.8% mainly used their smart phones. 35.4% used their devices to search for information that benefits the work under their responsibility, and 28.8% used their devices to attend meetings through their networks.

2. Factor Analysis: The EFA results revealed that all the pairs of latent variables were correlated at the statistically significant level of 0.01. Most variables correlated at a medium to a high level, with the correlation coefficients between 0.521 and 0.789. The KMO was at 0.808, which meant that the data was suitable at a good level for a component analysis. The Bartlett's Test of Sphericity, tested at the significant level of 0.05, yielded the result of $p < 0.05$, which could be interpreted that the five latent variables were correlated and suitable for a component analysis. The structural validity of the five latent variables was tested using CFA. The

results of the analysis revealed the consistency with the empirical data as shown in Table 1. The hypotheses were tested by SEM using the AMOS program as shown in Table 2.

Table 1 Results of the Analysis of the Assessment Model with Five Variables

Assessment Index for Model Suitability	Criterion*	Digital Competency	Work Values	Motivation Factors	Adaptive Capability	Effectiveness
Chi-square	> 0.05	148.571	14.738	155.09	17.57	65.635
χ^2 /df	< 3	1.881	2.456	1.520	1.716	1.930
GFI	> 0.9	0.960	0.990	0.961	0.989	0.972
AGFI	> 0.9	0.904	0.940	0.920	0.959	0.936
CFI	> 0.9	0.988	0.990	0.985	0.995	0.985
RMSEA	< 0.05	0.049	0.062	0.037	0.044	0.050

***Source:** Hair et al. (2010)

Table 2 Hypotheses Testing Using SEM

Correlation			Standard Regression Weight Estimate	t - value	Sig.	Hypothesis Testing Result
Work Motivation Factors	→	Effectiveness	.322	4.977	***	Accept H1
Work Motivation Factors	→	Adaptive Capability	.639	13.496	***	Accept H2
Work Motivation Factors	→	Digital Competency	.386	4.734	***	Accept H3
Work Values	→	Work Motivation Factors	.461	5.839	***	Accept H4
Digital Competency	→	Adaptive Capability	.348	8.047	***	Accept H5
Adaptive Capability	→	Effectiveness	.503	7.907	***	Accept H6
Work Values	→	Digital Competency	.126	1.290	.197	Reject H7
Work Values	→	Adaptive Capability	.054	1.016	.310	Reject H8
Work Values	→	Effectiveness	.072	1.415	.157	Reject H9
Digital Competency	→	Effectiveness	.000	-0.010	.992	Reject H10

*** $p < 0.001$

From testing the research hypotheses, it was found that the relation between the variables of work values and digital competency did not directly affect work effectiveness. The model, therefore, was adjusted according to this suggestion, as shown in Figure 2. The goodness-of-fit indices, therefore, were consistent with the criteria with $\chi^2 = 4.6777$; $p = 0.322$; GFI = 0.998; AGFI = 0.957; CFI = 0.998 and RMSEA = 0.033. This revised model was served as a guideline for the development of employees into iWorkers. The new model revealed the DE, IE and TE coefficients of the factors influencing work effectiveness, as shown in Table 3.

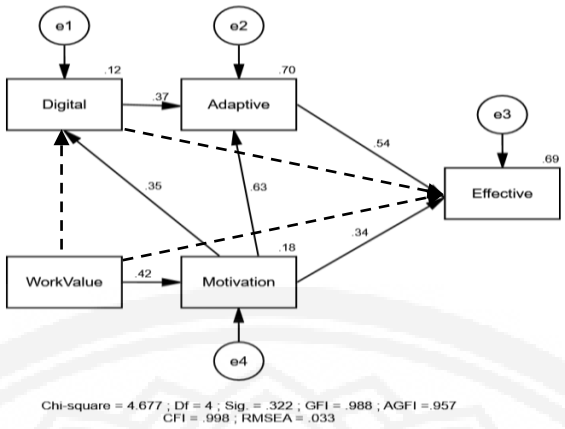

Figure 2 Model of the Relations of Variables Affecting Work Effectiveness

Table 3 DE, IE and TE Coefficients of Factors Influencing Work Effectiveness

Dependent Variable	Influence	Independent Variable				R^2
		Motivation Factors	Work Values	Adaptive Capability	Digital Competency	
Effectiveness	DE	0.340	0.000	0.541	0.000	0.688
	IE	0.411	0.316	0.000	0.202	
	TE	**0.752**	**0.316**	**0.541**	**0.202**	

Discussion

From the study, iWorkers can be defined as a group of people who possess knowledge of work and high and reliable work skills using information technology. This corresponds to the definition provided by Letter (2013). In addition, iWorkers work fast and accurately, focus on work efficiency, possess the ability to adapt to changes, and use at least two IT devices – mainly laptop computers and smartphones – simultaneously for work. This is consistent with the definition provided by Porteous & Simons (2020) which projects that iWorkers are workers who go online using their smartphones and free social media to search for information that is useful for their work. Similarly, Letter (2013) states that iWorkers are proficient in accessing and selecting data in data silos. The factors affecting iWorkers' work effectiveness include their digital competencies, work values, work motivation factors and adaptive capability.

iWorkers' digital competencies can be extracted into three components: 1) Data analysis, especially the ability to collect data from various sources. This corresponds to the report of Jarupoom (2016) which suggests that the competency development of IT personnel should aim at their ability to use various types of technology, their ability to search for and analyze quality information from many existing sources. Accordingly, the group conversations and interviews conducted for this study reveal that iWorkers are able to analyze data to be used for their work, to solve problems and to create work effectiveness; 2) Digital media and shared usage; iWorkers perceive the significance of working together online through various channels, for example, online data sharing spaces such as OneDrive, Dropbox, etc., online work spaces such as Microsoft SharePoint, Google Docs, etc., screen sharing programs such as Windows Remote Assistance, Team Viewer, JoinMe, etc., and video conference programs such as Skype, Google Hangout, etc. that help increase work efficiency through the ability to access information from anywhere and at any time and help iWorkers to increase their work efficiency and promote the growth of their businesses. This agrees with Porteous & Simons (2020) who state that iWorkers working online

through their smartphones and free social media are able to use digital tools to enhance their effectiveness and comprise a new type of employees who work on digital platforms (Merab, 2020). iWorkers make the most of existing digital tools, devices and technologies such as computers, telephones, tablets, computer programs and social media in their work, in working with others, or in developing work processes or systems in their organizations through four dimensions of ability, namely to use, to understand, to create and to access digital technology; 3) Digital knowledge and skills, especially in the accessibility and awareness of advanced digital usage which is a crucial competency relevant to the perception and ability to use digital technology for security, for example, the use of name lists, prevention of threats, prevention of malware, correct and safe usage of the Internet, etc. This is in accordance with Letter (2013) and the results from the interviews and group discussions which indicate that iWorkers have the ability to work well with basic computer programs such as basic application software, email, the Internet, etc. When new technologies are introduced at work, they can build on the knowledge they already have or apply new knowledge in their work. From testing the hypotheses, it has been revealed that digital competency has a direct positive effect on the adaptive capability of iWorkers and an indirect effect on their work effectiveness. These results contrast with those projected by Mitrani et al. (1992) and Spencer & Spencer (1993) which state that competency is specific to an individual and causatively related to his effectiveness. Since iWorkers have the ability to make use of information technology and use it regularly, their digital competency does not correlate with their work effectiveness.

As for work values, iWorkers emphasize highly efficient work. They embrace self-development and will not let work opportunities go to waste. The work values can be extracted into two elements: 1) Extrinsic Values; and 2) Intrinsic Values. iWorkers put first priorities to Extrinsic Values such as job security, compensation and benefits. This agrees with Nord et al. (1988) who explain that individuals work for wages, benefits and job security. From testing the hypotheses, it has been found that work values have a direct effect on work motivation factors which lead to satisfaction (Zytowski, 1994; Dawis, 2002) and has an indirect effect on work effectiveness. Therefore, an understanding of iWorkers' work values will lead to the discovery of their work motivation factors which will consequently bring about work effectiveness and good performance. Work values, nevertheless, does not have a direct effect on digital competency and adaptive capability but have an indirect effect on these aspects through motivation factors. This finding corresponds to that given by Herzberg et al. (1959) which states that motivation factors encourage employees to be satisfied at work and affect their adaptive capability and work effectiveness.

iWorkers' motivation factors can be divided into six elements: 1) Acceptance; 2) Work Characteristics; 3) Security; 4) Compensation; 5) Work-Life Balance; and 6) Career Advancement. iWorkers pay attention to work environments. This accords with Marcus (2014) who states that Generation-Y workers are keen on their work environments. The majority of the individuals in this study's sample group are Generation-Y workers, and supportive work environments will encourage them to work enthusiastically. iWorkers pay more attention to motivation factors than to hygiene factors. This agrees with the theory of Herzberg et al. (1959) and the study of Yusoff & Kian (2013), but disagrees with the findings reported by Aworemi et al. (2011) who state that motivation factors should start with a focus on hygiene factors such as wages and job security before emphasizing good work environments and work interest. As iWorkers project a determination for self-development, staff training is an inspiring factor that is directly related to work effectiveness. From testing the

hypotheses, it has been revealed that motivation factors have a direct effect on work effectiveness, adaptive capability and digital competency.

For adaptive capability, one element has been extracted: work. The aspect of work relates to the use of innovation and technology in the organization, accurate and timely data accessibility, teamworking and organizational culture. From testing the hypotheses, it has been found that the staff's adaptive capability has a positive effect on their work effectiveness. iWorkers are highly adaptive with the focus on their work effectiveness. This corresponds to the studies by Prentice & King (2013); Cullen et al. (2014); Sony & Mekoth (2016) and Udin et al. (2019) that state that an individual's adaptability at work is defined by his ability in various aspects such as the ability to learn the work, to communicate with others, to adjust to the organizational culture and to solve problems creatively. When Technological Disruption occurs and information technology is used in the organization, iWorkers will adapt well to the change, and this will result in their work effectiveness.

For work effectiveness, three elements have been extracted: 1) Knowledge, which is a factor that creates effectiveness at an individual level (Gibson et al., 1982); 2) Work environments that enable workers to share their knowledge while working together and organizations to provide resources for their operations. This corresponds to Khiewvichit (2015) who states that IT readiness has a positive influence on the technological application potential and work effectiveness; and 3) Independence that enables flexibility at work, a quality that is becoming trendier among workers of 20-30 years of age who are paying more attention to their work-life balance than to salaries and work benefits. Flexibility at work, nonetheless, is related to technology that is used to support and provide workers with flexibility and effectiveness such as laptop computers, basic program packages for digital devices and the organization's policy supporting its staff to use their own devices at work.

From studying the characteristics of the iWorkers in the S-Curve and New S-Curve industrial groups that affect their work effectiveness, it has been found that the definition of iWorkers in this case is not so much different from that provided by scholars in other countries, with main characteristics that feature high work skills using information technology, knowledge and the ability to access and share information. This study has specified several characteristics for iWorkers, namely digital competency, work values, motivation factors and adaptive capability, which apply to all workers regardless of the differences in age and knowledge. Letter (2013) states that iWorkers only look at the aspect regarding the use of information technology to access and share information through smartphone technology (Porteous & Simons, 2020) and digital platforms (Merab, 2020). This aspect specifically refers to those characterized in the Generation-Y group. As for Thailand, several types of work, especially those in industrial factories and in the service sector, are being replaced by digital technology. At the same time, new forms of work that require knowledge and high skills are emerging. Workers of all ages, therefore, must be developed accordingly so that they can adapt to the changes. The 2016 Thailand Digital Economy and Society Development Plan states that organizations must promote the development of their employees' specific digital skills. Having workers with suitable abilities in key roles at suitable periods is a key strategy. iWorkers comprise a group of workers that can meet the demands of work in the digital age with their digital competency and adaptive capability in times of change. The development of employees into iWorkers focuses on enhancing their digital competencies which can be divided into the following:

1. Knowledge and skills: The knowledge of work and both soft and hard IT skills such as skills in using personal computers, laptop computers, smartphones and other related devices and skills in using tools to select information from the social media can be acquired through trainings. The transfer of knowledge should be

applicable to accommodate workers from different age groups, adaptable to individual learning styles, suitable for group work (Davis et al., 2006) and sensitive to each individual's learning priorities and perception (Foster, 2017). The trainings must include all three aspects of digital competence, namely data analysis, digital media and online cooperation, and digital knowledge and skills. The development of the workers' IT ability will result in their work effectiveness (Khiewvichit, 2015).

2. Studies of work values, motivation factors and adaptive capability: These three factors affect work effectiveness. Motivation factors and adaptive capability have direct effects on work effectiveness. These two factors combined can predict 69 percent of work effectiveness. It is recommended that the work environments encourage knowledge sharing and cooperation, teamworking and flexibility, and that the organizations provide technological support that enables speed and ease of access through network systems. Therefore, data storage needs to be done in the Cloud system so that the data can be accessed at all times and from all places, which will facilitate higher work efficiency, larger business growth, higher productivity and better interactions with customers.

Conclusion and Recommendations

iWorkers comprise a group of people who meet the increasing needs of a new model of work, especially in the digital workplace ecology. They constitute a vital core empowering activities that focus on creating value for the economic and social system in the context of mobility workplaces and sharing economy. Digital competency is an important competency. Technological and digital skills, data analysis skills and media creation skills are especially important for creating and distributing contents. iWorkers' abilities support future businesses of the S-Curve and New S-Curve industrial groups that are leaders of change who embrace the adoption of new technologies in the adjustment and development of their products and business models. These industries include digital industrial groups and companies focusing on man-machine cooperation that perceive the significance of using machines and technologies to facilitate human efficiency. The findings of the study can be summarized according to the study's objectives as follows:

Objective 1: iWorkers' digital competency prioritizes data analysis, digital media, data sharing and digital knowledge and skills. iWorkers' work values prioritize Extrinsic Values such as job security, compensation and benefits. iWorkers' motivation factors prioritize acceptance, job characteristics, security, compensation, work-life balance and career advancement. The work values have a direct effect on the motivation factors, and the motivation factors affect digital competency leading to work effectiveness.

Objective 2: iWorkers' adaptive capability relates to the use of innovation and technology in their organizations. Therefore, accurate and timely data accessibility, teamworking and organizational culture are factors that accommodate iWorkers' adaptability which, in turn, has a positive effect on their work effectiveness. In addition, their digital competency and motivation factors affect their adaptive capability leading to work effectiveness.

Objective 3: A model for the development of workers into iWorkers in order to enhance work effectiveness focuses on enhancing the workers' digital competency. The development makes use of the IT knowledge and skills – both soft and hard skills – and employs motivation factors as tools to increase the workers' digital competency and adaptive capability that will lead to work effectiveness. Therefore, the development of workers into iWorkers is compatible with the 2016 Thailand Digital Economy and Society Development Plan which aims

to produce a new generation of workforce with high digital skills and the ability to respond to changes of the work models that will result in increased effectiveness.

Recommendations for Application

The research study on "iWorkers: Development and Effectiveness" can be applied to provide a guideline for the development of workers into iWorkers in order to increase organizational effectiveness. The process is conducted in the following steps: 1) Recruitment and staffing, based mainly on the candidates' digital competency; 2) Training and development, through promoting employees' digital potential especially in data analysis, digital media and online cooperation in order to meet the demands of the organizations in the digital age; 3) Payroll management, with consideration concerning salaries that match the employees' proficiencies to prevent iWorkers from leaving the organizations, which will result in additional expenses on staff recruitment and development as well as a waste of time and loss of income; and 4) Human resource maintenance process, with consideration concerning acceptance, respect, promotion and career advancement that will result in iWorkers' satisfaction and work effectiveness.

Recommendations for Further Studies

Since iWorkers are a new generation of labor of the digital age, several recognized institutes conduct digital competency tests to measure workers' digital competencies and provide workers with certificates, for example, Thailand Professional Qualification Institute (Public Organization), The International Computer Driving License (ICDL), Information Technology Professionals Examination (ITPE), COMPTIA Certification, etc. These institutes are licensed to issue certificates as proofs of individuals' skills from basic to advanced levels. However, a test measuring the skills of iWorkers is still lacking. Further studies on this subject could focus on designing a standard and reliable assessment model for iWorkers.

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