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Job Design and Knowledge Productivity among Administrative and Diplomatic Officers (PTD)

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Abstract

Knowledge productivity, the central theme of this thesis, brings on new challenges in managing the knowledge workers in the 21st century. This thesis was embarked with the purpose to understand the relationship between the job design and knowledge productivity among Administrative and Diplomatic Officers (PTD). The PTD has been regarded as a premier knowledge worker in the Malaysian government. They primarily acts as a think tank in assisting the government in formulating and maintaining the public policies portfolios. In accordance with the rapid transformations in the age of information, the PTD is required to have knowledge and competencies to face the increasing responsibilities and upcoming challenges. Thus, it is the responsibility of the Malaysian Federal Ministries in overseeing the productivity of their knowledge workers. However, as a consequence of the transition towards the knowledge economy, most organizations including the public sectors are dumbfounded on understanding the drivers of productivity. The traditional factors for workers' productivity such as rewards and incomes have lost its significance. Organizations clearly do not understand on the concept of knowledge productivity and how to make the knowledge more productive for the benefits of their workers and organizational improvements. Accordingly, based on the literature studies, the researcher found that there is lack of studies with regards to knowledge productivity in the context of Malaysia's public sectors. This has created a big gaps on how to harness the knowledge of the civil servants, particularly the PTD to become more productive. Identifying the factors that influence the PTD's knowledge productivity could facilitate the public sectors in enhancing their knowledge workers' competency and innovation. This study employs a quantitative research approach involving 305 PTDs working in 21 Malaysian Federal Ministries in Putrajaya. Preliminary studies were conducted to gain better understanding on the perceptions of knowledge productivity in the public sectors, followed by a survey to validate the developed conceptual framework and testing the formulated hypotheses. Job design characteristics namely task, knowledge, social and work context characteristics were hypnotized to be significantly related to knowledge productivity measured in terms of knowledge creation process and innovation. The statistical analyses findings revealed that all the formulated hypotheses were well-supported. Hence, the Malaysia's public sectors need to design the jobs of the PTDs more fittingly as it could harness their knowledge activities to be more productive and this leads to ideas in innovating the public services and processes.

Keywords: Job design; task characteristics; knowledge creation process; SECI; Malaysian federal ministries

1.0 INTRODUCTION

The term knowledge productivity was coined by Kessels (1996) to refer to the process of creating and disseminating new knowledge throughout an organisation and use it in innovating new technologies and in improving the organisation products, processes and

services. The root of this research is the transition of the world economy from an industrial age into a knowledge economy era (Drucker, 1993) where the organisation and the people work together in possessing and exploiting knowledge resources to achieve greater economic growth and higher social development. According to Drucker (1999) and Stam (2007), knowledge economy comprises three fundamental characteristics. First, the knowledge, which has become a crucial asset to individual, organisation and to the country in the age of knowledge economy. The emphasis on knowledge as a means of production has triggered a new phenomenon which could provide more excellent ways in producing goods and services at lower costs. Second is the intellectual capital which refers to non-monetary and non-physical resources (Stam, 2007) and third is the knowledge productivity as the biggest challenge in the knowledge economy. Although the three characteristics are the pillars of knowledge economy, the highlight of this study is on knowledge productivity.

Though knowledge productivity is generally a new concept, the combination of knowledge and productivity is not. Generally, the literatures on knowledge productivity interpret it into two different perspectives (Stam, Evers, Leenheers, de Man, & van der Spek, 2004). Both perspectives are intended to improve the knowledge productivity performance. The first perspective interprets knowledge productivity as knowledge management (KM) where it focuses on finding the drivers of knowledge productivity in order to enhance the knowledge creation conditions. Some of the researchers that investigate knowledge productivity from the KM perspectives include the work of Kessels (1996) on Corporate Curriculum, learning organisation framework by Keursten, Kessels and Kwakman (2003), Knowledge Work Productivity Assessment (KWPA) by Antikainen and Lönnqvist (2005), and office design by Hameed and Amjad (2009). Meanwhile, the second perspective interprets knowledge productivity as intellectual capital (IC) measurement where it focuses on measuring the knowledge based results of knowledge productivity (Stam, 2007). Some studies concerning the IC measurement are the work of Edvinsson and Malone (1997b), Stewart (1997), Sveiby (1998) and Zegveld (2000).

Going through the literatures, this study is convinced that there is a strong relationship between KM and knowledge productivity. Weggeman (2001) claims that KM is a formal method in influencing knowledge productivity. Stam (2007) refers to KM as deliberate initiatives that are intended in stimulating the knowledge creation process which in return facilitates innovation. Stam (2007) also states that knowledge productivity is “the process of knowledge creation that leads to incremental and radical innovation.” Noticeably, in the KM perspective, knowledge productivity can be seen to link to knowledge creation process and innovation. Knowledge creation processes produce knowledge and innovation is developed by applying the created knowledge. Again, knowledge is honoured as the ultimate source in invoking the knowledge creation process and innovation.

Thus, it is rational when knowledge productivity is deemed as a complicated dealing where the mean of production (i.e. knowledge) and the tool of production (i.e. brain) for knowledge productivity is possessed by knowledge worker. Therefore, it is also agreed when Stam (2007) states that the workplace is where a powerful knowledge is produced and the key production tool in today’s organisation is the employees, particularly, the knowledge workers. In today’s contemporary era, the knowledge workers dominate the market demands (Kessel, 2001b). Organisations, especially the knowledge intensive organisation (KIO) are increasingly employing professional knowledge workers. Rather than using physical efforts and tiresome routines, knowledge worker uses personal knowledge and expert judgements to accomplish given works on a daily basis. Drucker (1999) claims that an excellent production of an organisation depends on the ability of the knowledge worker in making the knowledge productive. Thus, it is important that organisation observes and identifies the sources or factors that influence the knowledge workers’ productivity in order to improve the conditions for knowledge creation and innovations (Stam, 2007). However, as a

consequence of the transition towards the knowledge economy, organisations clearly do not understand the concept of knowledge productivity and how to make knowledge more productive (Stam, 2007) as the traditional factors for workers' productivity such as rewards, wages, location and work-outcome quantity may have lost their significance.

There are few studies that discuss on the factors influencing the knowledge productivity in the context of other countries that can be adapted by this study. Studies such as by Bosch, Ruohomäkim and Vartiainen (2009) claim that the factors that influence the knowledge work productivity consists of the organisational context, team processes, workplace team structure and composition. Sobia and Bakhtiar (2011) justify that organisational culture, reward and incentives as well as technology can increase the productivity of the knowledge workers. Meanwhile, Tongo (2011) discovered that incentives can also boost public servants' productivity level. Other than the abovementioned factors, Campion, Papper and Medsker (1996), Raghunath (2007) and Haenisch (2008) also have described on work or job design as productivity factors in their study. These factors including autonomy, interdependence, task variety and task significance are considered to be important. It enhance the sense of responsibility and ownership towards the assigned work and also help in making the work more interesting to be executed. The study also did find some Malaysian studies on productivity. However, these studies focus either on traditional productivity (Abdul Rashid, Zakaria, & Chan, 1997; Zulkornain, Law & Norashidah, 2005) or on research productivity (Zainab, 2001; Aminuddin, Tymms & Habsah, 2008). Thus, not much known about the extent of knowledge productivity in relation to knowledge creation process and innovation in the context of organisations in Malaysia whether the public or private sectors. Similarly, little is known on the factors that contributes towards the knowledge productivity among Malaysia's knowledge worker. Against this background, this study attempts to understand the relation between knowledge creation process and innovation with regard to knowledge productivity in the context of Malaysia's public sectors. The study also intends to identify the contributing factors that influence the knowledge productivity among the knowledge workers working in the Malaysia's public sectors.

The transition of the world economy from an industrial age into a knowledge economy era is widely acknowledged. A knowledge economy is where an organisation and the people work together in possessing and exploiting knowledge resources to achieve greater economic growth and higher social development. As knowledge gradually turns accountable in value creation, it has become a crucial asset to individual, organisation and to the country in the age of knowledge based economy (k-economy). According to Drucker (1993), the roles of knowledge have been transforming since the Industrial Revolution. From 1750 to 1880, knowledge was applied in creating production tools. Subsequently, in the second phase during the Productivity Revolution (1880 to 1945), knowledge was applied to labour and processes. After 1945, during the Management Revolution, knowledge is applied to knowledge itself. As a result, traditional factors of productivity such as labour and capital has lost its role in the production process. The interest in generating wealth and value creation using human knowledge gradually overtake the wealth generating through processing of natural resources. This is also agreed by Autio, Sapienza and Almeida (2000) that state organisations that expand and exploit knowledge as main resources tend to achieve greatness than the one that is dependent on tangible resources.

The base point of this study is the importance in having a clear understanding on the drivers or factors that contribute towards making knowledge more productive, which in turn will enhance the knowledge workers' productivity and improve organisational performance. Drucker (1993) also declares that the biggest management challenge in the 21st century will be knowledge worker productivity. Drucker's statement is undeniably true as in today's economy; production is based on knowledge (Stam, 2007). However, as a result of the transition to the new knowledge economy era, many organisations are struggling in

identifying the source of productivity and its growth as they are unacquainted in managing the knowledge productivity (Stewart, 1997). Stewart (2002) adds that the lack of proper means to provide information on the knowledge processes has become the main obstruct in designing policies to improve knowledge productivity. The management also has no experience or understanding in managing their knowledge worker; let alone their knowledge productivity. Understanding these situations, it is difficult to assume whether the knowledge worker's productivity is sufficiently exploiting the knowledge resources in enhancing their performance, productivity and innovation.

With accelerating demands for knowledge along with faster service response time, some private organisations and even the public sectors have reinforced their strategies to gain extra competitive advantages by continuously improving their business or service processes. One way of doing this is to design their daily operations to support the productivity of knowledge (Kessels, 1996). From the KM perspective, the key step in making the knowledge productive is by continuously creates new knowledge. This in return will facilitate the organisational innovation capability.

Highlighting on the public sector, this sector is primarily concerned on providing various governmental services, mainly services with regard to the public's wellbeing. For the past few years, the Malaysian government has been focusing in enhancing its public service delivery to be more efficient and productive. Malaysia's 15th Yang di-Pertuan Agong, Sultan Muhammad V has also called for the government to develop innovative ways in maintaining the publics' wellbeing as well as in reducing their burdens (Bernama, 2017). The Malaysian government has realized the need in improving its innovations and governance in order to transform and improve the efficiency of its services. The introduction of Electronic Government initiative or e-Government was launched as a strategy to reinvent the country's framework. The implementation of the e-Government policy in various public sectors have helped in assisting and accelerating the effectiveness and accessibility of the public delivery services through electronic online system. This innovation also promotes the K-Economy initiatives.

As stated repeatedly by many researchers such as Nonaka and Takeuchi (1995), Easa (2011), Stam (2007), the driving force of an innovation is the effectiveness of the knowledge creation ability. As knowledge is the valuable input for innovation, the public sector should act as a platform in ensuring the continuous production of knowledge through knowledge creation process in the workplace. However, despite the imperativeness of innovation to the concept of knowledge creation, not much is really known on the significance of knowledge creation process on innovation with regards to Malaysia's public sectors. This study has not been able to find any local study other than Masrek, Noordin, Yusof and Anwar (2014) that comprehensively linked knowledge creation process with innovations in the public sectors. This is inline with Stam (2007) and Easa (2011) who claims that studies investigating the relationship between knowledge creation and innovation have received little consideration. For this reason, this study is initiated to identify whether the knowledge creation process is significantly related with innovation in the context of the Malaysian Federal Ministries.

It is said that in the 21st century, the burdens placed on the public servants, mainly of their skills, knowledge and capability have been progressively becoming more complex (United Nations, 2005).Within the Malaysian government, the public sectors mainly consist of knowledge workers, particularly the PTDs. As the main policy makers of the government, PTD is the prime mover in promoting the widespread use of knowledge. Most service, product and process innovations in the Malaysia's public sectors are practically the brainchild of the PTDs. The PTDs, as the agents of service productivity have innovated themselves to become efficient in leveraging knowledge in the public sectors' operations. Accordingly, the Malaysia's public sectors should improve the PTD's knowledge productivity;

that is to make their knowledge more productive. However, the lack of information and inadequacy in studies has created big gaps about how to harness the knowledge of the PTD to become more productive. Local studies addressing the knowledge productivity still remain scarce.

Furthermore, the Malaysian government has reported that the civil service has become bloated with overflowing civil servants, which have caused the government expenses to increase and leads to the growing plunge in the revenue (FMT Reporters, 2017). Navaratnam (2017) states that although the civil servants have been provided with premium benefits such as better salaries, secured pensions as well as finest health services, their enthusiasm to be more productive in work has been passive. He adds that the public also has perceived the civil servants' productivity as declining due to baseless delays in government's project and noticeably, the lackadaisical approach shown towards the public while dealing with the public sectors. In the context of this study, not much is also known whether the PTD is able to demonstrate a dynamic productivity, expertise and efficiency towards the knowledge economy aspiration. Identifying the factors that may influence knowledge productivity can facilitate the public sectors in enhancing their civil servants' competencies. This is also in line with Malaysia's Prime Minister vision in making the 2017 as the year of delivery, where he urges the civil servants to ensure on-time implementation and delivery of government projects in prompting the economic growth and maintaining the wellbeing of the public (Anis, 2017). Accordingly, the public sectors should be able to identify the drivers of the PTD's productivity to continuously progress, improve and innovate their capabilities from time to time in order to stay productive and relevant to the public. Thus, it is rationale that this study also initiated in finding the factors that drive the PTDs' knowledge productivity.

Drucker (1993) and Frick (2011) suggest that in identifying the drivers of knowledge workers' productivity, one should reflect on the knowledge workers relationship with their environment. Most past studies have neglected the idea in creating a work environment that may increases the knowledge worker's performances and productivity. Accordingly, Husain (2010) states that job design is used in managing and enhancing the work performance of knowledge workers. Job design is aimed to modify the working methods by taking into account the motivational factors as well as the underlying factors surrounding their work environment and social settings. Job must be redesigned to acquire the best fit between the needs of an organisation and their employees. Well designed jobs could lead to a positive impact on job satisfaction and enhances the performance's quality.

Numerous studies have been conducted in assessing the influence of job or work design in enhancing the organisational and individual performances. For instance, Stebbins and Shani (1995) state that job design as an enabling attribute for knowledge creation as it supported not only the creation of new knowledge, but also in utilization and the circulation of the knowledge. However, in the context of knowledge productivity, the job design are not commonly discussed. Specifically, the job design have not yet been comprehensively fused within knowledge productivity study. Against this reason, this study decides to adapt and assess the job design characteristics as the factors that may influence the PTD's knowledge productivity. The study aims to examine the relationship between job design characteristics, namely the task characteristics, knowledge characteristics, social characteristics and work context characteristics with knowledge productivity dimensions (knowledge creation process and innovation). The study firmly believes that to create the willingness of the PTD's to create knowledge and to innovate, the public sectors should design jobs that could motivate and cater the needs of the PTDs.

2.0 LITERATURE REVIEW

2.1 Overview of Administrative and Diplomatic Officers (PTD)

Better known as Pegawai Tadbir dan Diplomatik (PTD), it is one of the positions serving under the public sector or government of Malaysia (Pegawai Tadbir dan Diplomatik [PTD], 1999). As the pillar of the Malaysian public service, Administrative and Diplomatic Officer or PTD is responsible for the formulating, planning, monitoring and implementing public policies and international communications. In accordance with the skills and responsibilities in bearing of their duties, PTD has been regarded as a premier knowledge worker in the public sector (Jabatan Perkhidmatan Awam [JPA], 2000; Pegawai Tadbir dan Diplomatik (PTD), 2007; Khaled, 2011).

2.2 Job Design and Knowledge Productivity

The evolutions of job design theories as aforementioned has been evolving for several decades. The importance of job design has been noticeable by theorists, practitioners and scholars since the year 1776. Job design theories are intended to design and redesign jobs and its environments. Job design models could be used to redesign the work content at a time when the employees productivity and satisfaction seems to be declining (Faturochman, 1997). Achieving a good job design is obtaining the best fit between the need of management and the needs of the employees. It is an ongoing process to make adjustments on jobs, tasks, people or workplace according to constant demand at a particular time. As discussed above, numerous studies have been conducted to investigate the influence of job or work design in enhancing the organisational performance. Through the reviews, the researcher understands several points in designing job such as allowing employees' autonomy, providing work related feedbacks, offering social support, designing a good workplace, allocating tasks based on competencies and promoting good organisational practices. Though it might seems to be common practices, previous studies have confirmed that it could leads to positive influences on employees' performance (Karasek et al., 1998; Morgeson & Campion, 2003; Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007; Ali & Aroosiya, 2010; Grant et al., 2011).

For the past few years, the nature of works has been transforming dramatically. The once traditional manual labour has been reshaped by materialization of new technologies and shifted towards service and knowledge work (Adler, 1992). Morgeson and Humphrey (2008) state that in the service and knowledge oriented industries, the capability in creating and producing innovative products or services are made by exploiting knowledge resources. In other means, the industrial economy has changed into a new reality known as the knowledge economy (Drucker, 1993) where knowledge has become a production factor rather than labour, land or capital (Weggeman, 1997). In response to these changes, the work and job structure have also been evolving. Parker et al. (2001) claim that the present theoretical models and studies on job design are not in line with the rapid changes of the work contexts. These include in conceptualizing the nature of workforce of the knowledge workers in knowledge based sectors, enhancement of the interpersonal tasks in service industries, exemplify of the task interdependence as well as flexible working arrangements. In accordance to these, new wave of job design theories and researches in understanding the changing nature of work have been instigated. Practitioners and scholars begin to revise the impacts of these changes to the job design theories and job characteristics (Torraco, 2005; Morgeson & Humphrey, 2006; Morgeson & Humphrey, 2008; Grant & Parker, 2009).

The trend in job design studies is to redesign jobs in increasing performance, productivity and innovation of the employees and organisation. This can be seen as an attempt to integrate the job design perspective with varying organisational perceptions. There have also been researchers that studied the work or job characteristics in relations to knowledge worker such as Hernaus and Mikulić (2014) as well as Yusof, Masrek and Noordin (2016b). In general, these studies intend to find the work characteristics that influence the knowledge workers' performance and knowledge productive capability. According to Husain (2010), when designing the knowledge workers' job, the management should consider on reflecting the core job dimensions; namely the autonomy, skill variety, task identity, task significance and feedback; in creating jobs and tasks that can be more productive and satisfying. The core job dimensions mentioned by Husain (2010) are included in the task characteristics of WDQ. In the context of this study, the PTDs are the knowledge workers serving under the public sectors in Malaysia. As the core policy makers, PTDs are the prime mover in promoting the widespread use of knowledge especially in their roles in the transitions towards knowledge based economy as declared in the country's National Key Results Area (NKRA). Though the PTD plays a critical role in sustaining the efficiency of the public sectors, literature emphasizing on their job design characteristics has been very limited. Thus, the researcher is unclear whether the Malaysia's public sectors are still relying on outdated models in designing the jobs of the PTDs or not. Since the primary source of knowledge is always from the employees' brain, the government's administration need to be concerned on their knowledge workers' job design. The job design and nature of work influences the workers in performing their tasks (Torraco, 2005). It can also facilitate them to be more productive, motivated and committed to their job.

As stated by Morgeson and Humphrey (2006), in spite of the mounting interest in investigating the significance of work design, research on the assessment of work and job characteristics has been narrow, deficient and problematic. Torraco (2005) alleges that some elements of the emerging job designs requisite are not included and explained in the existing work design theories. Thus, some steps need to be taken to walk out from *rustic* theoretical ground and venture into trending job design research. In an effort to address some of these weaknesses, the researcher attempts to create a fused theory of knowledge productivity that incorporates the job design within the KM perspective. Specifically, this study aims to broaden the focus of job design theory by investigating the possible motivational, social, and work context aspects of WDQ that may influence the PTDs' knowledge productivity. Thus, by conducting this study, the Malaysia's public sectors are able to design the job of the PTDs more appropriately, which in turn could harness their knowledge activities to be more productive in generating knowledge and lead to ideas in innovating the public services and organisational processes.

3.0 RESEARCH FRAMEWORK

The research model is an adaption based on the work and insights from various previous studies including by Hackman and Oldham (1976, 1980), Nonaka and Takeuchi (1995), Morgeson and Campion (2003), Morgeson and Humphrey (2006) as well as Easa (2011, 2012a, 2012b). The overall framework is developed based on the work of Morgeson and Humphrey (2006) as well as Easa (2012a).

3.1 Knowledge Productivity

Knowledge productivity is defined as the process of knowledge creation that leads to service and process innovation. The first element, which is "the process of knowledge creation", refers to a blend of related activities that create knowledge. The activities in the knowledge creation process, which is also known as knowledge processes include the identifying,

gathering, exchanging and interpreting relevant information. Information is employed in order to develop new abilities or knowledge. Thus, the knowledge processes need to be exploited in triggering innovation. Meanwhile, the second element, "service and work process innovation" is the results of utilizing the knowledge created from the knowledge processes. It refers to the changes or improvements made through innovating the services and work organisation.

3.2 Knowledge Creation Process

Based on Kessels (1995) and Stam (2007) perspectives, knowledge productivity is viewed as closely linked to the ability to learn and contribute to the ability in making knowledge productive. As knowledge is created through learning, the knowledge creation process has to be stimulated, consequently this will also enable innovation. In this respect, the effectiveness of the knowledge creation process directly influences the productivity of knowledge as the driving force of innovation. Nonaka and Takeuchi (1995) propose the SECI model to explain the creation of knowledge from the KM perspective. Through this model, knowledge is created and extended through social processes between individuals by means of the interaction of tacit and explicit knowledge within four modes of knowledge conversion processes, respectively the socialization, externalization, combination and internalization modes. Most of the studies such as by Nonaka and Takeuchi (1995), Salmador and Bueno (2007), Tsai and Li (2007), Martin et al. (2008), Schulze and Hoegl (2008), Li et al. (2009) as well as Easa (2011) suggest that the SECI processes improve the work performances of the employees and also their respective organisations. For example, activities such as formal meetings, seminars, storytelling and training programmes encourage the socialisation process between members of the organisations and sometimes with non-members. These activities enables employees to interact their experiences, ideas, suggestions through personal interactions (Salmador & Bueno, 2007; Tsai & Li, 2007; Martin et al., 2008; Li et al., 2009) which may trigger some solutions in solving work related problems or even ideas in innovating.

Meanwhile, organisations could gain countless benefits through externalization process. Activities such as documentation of expert's experiences as well as previous projects (Salmador & Bueno, 2007) will prevent redundant or unnecessary preparations in developing processes or techniques that have already been carried out or existed within the organisation. Externalization indeed could help the organisation to advance more substantially by means of achieving goals in a cost and time-effective manner and diverts its resources for more worthy opportunities. Other than this, the routines of documenting organisational best practices may help the employees in producing superior work-outcomes. Considering that previous studies have repeatedly highlights the significant aspects of SECI processes in simulating knowledge, the researcher decided to include the four modes of knowledge creation process as part of the knowledge productivity concept to be investigated in this study.

3.3 Innovation

Knowledge creation process strongly supports individual and organisational innovation initiatives. There are various studies suggesting that SECI processes have strong significant with innovation including as discussed in the work of Keursten et al. (2006), Stam (2007), Eliufoo (2008), Huang and Wu (2010), Easa (2012) and Iacono et al. (2012). SECI processes is said to support the selection and implementation of new ideas in innovating products, services and processes. Nonaka and Takeuchi (1995) claim that the transferring of tacit and explicit knowledge within the members of organisation and also non members could act as mechanism in generating new ideas to innovate. Hence, it is advised that organisations plan a proactive approach and platform in encouraging their employees to

cultivate innovation capability. Apart from this, Madhavan and Grover (1998) as well as Yang (2007) state that generating of new knowledge is crucial during the development of new products and services. Danneels and Kleinschmidt (2001) add that, the new product and services will guarantee to be a success in the competitive market with the backing from knowledge creation processes. To this effect this study investigates the relationship between the knowledge creation process and innovation in terms of the service innovation and process innovation with regard to the PTDs working in the Malaysia's public sectors.

3.4 Job Design

From the organisational aspect, job design plays crucial part in supporting the employees' work performance in achieving organisational relevant outcomes as it may directly or indirectly influence the manner they perform their responsibilities and tasks (Ali & Aroosiya, 2010). Hameed and Amjad (2009) add that by providing the needs of the employees such as with a conducive workplace could help in increasing their work productivity. Hence, the job design characteristics need to be assessed and restructured constantly in order to maintain an efficient work performance and productivity.

3.4.1 Task characteristics

Task characteristics focus on the scope and the nature of a job and also the manner in accomplishing the tasks associated with the job. The dimensions of task characteristics are autonomy, task variety, task significance, task identity and feedback from job (Morgeson & Humphrey, 2006). These dimensions are some of the core job characteristics that motivate the employees to enhance their work performance and acquire the job satisfaction (Hackman & Oldham, 1980). Autonomy is defined as the liberation on the manner of conducting own work or task (Hackman & Oldham, 1975; Humphrey, Hollenbeck, et al., 2007). Some studies broaden the concept of autonomy by suggesting that autonomy could represent the ability to schedule the timing of own work, making decisions and decide on how to carry out tasks (Hackman & Oldham, 1976, 1980; Jackson, Wall, Martin, & Davids, 1993; Humphrey, Hollenbeck, et al., 2007; Morgeson & Humphrey, 2006). Thus, this study will include the three aspects of autonomy, which are (i) work scheduling autonomy, (ii) decision making autonomy and (iii) work methods autonomy. Nonaka and Takeuchi (1995) claim that employee's empowerment or autonomy encourages the creation of knowledge. Employees will have the freedom to seek new methods or solutions in managing challenges or while dealing with product development. Employee with authority tends to make responsible actions in delivering excellent work outcomes.

Task variety is associated with the range of tasks that need to be performed by the employees on their job (Morgeson & Humphrey, 2006). Task variety is similar to job enlargement, which is one of the many approaches in job design. Task variety expands a job to more interesting varied tasks; thus could increase the motivation level of an employee (Ali & Aroosiya, 2010). Meanwhile, task significance reflects the impact of one's job on the lives or works of others, whether inside of the organisation or in the outside environment (Hackman & Oldham, 1975, 1980; Morgeson & Humphrey, 2006). Task significance is significant in increasing employees' job performance level as well as dedication towards owns job. According to Yusof et al. (2016), task significance enhances employees' loyalty with their organisation upon the realization on the significance of their job to others. Subsequently, they will be more willing in sharing and interacting their expertise to other members of the organisation.

Task identity is where the employee performs identifiable tasks and is involved in each step of the tasks completion from the beginning to end (Hackman & Oldham, 1980). Task identity

is recognized as an important element of job satisfaction where it elevates a sense of pride in the employees toward their job (Hackman & Oldham, 1976). The employee full participation in a task could encourage the sense for innovation (Yusof et al., 2016). For instance, critical and inventive thinking could be fostered while the employee is involved in improvising the organisational policies, procedures or products. Lastly, feedback from job describes that the job will provide sufficient information on one's job performance level (Humphrey, Nahrgang, et al., 2007). Morgeson and Humphrey (2008) explain that the employee will receive timely feedback directly from the job they are performing. This feedback will permit the employee to consider their goals with regard to their work performance and work attitudes and also assess their skills and knowledge in performing the given tasks.

Going through the literature review related to motivational aspect of job design, task characteristics have been linked repeatedly with job performance, motivation and satisfaction. Scholars have yet to establish a clear association between task characteristics and knowledge productivity. However, a recent study by Yusof et al. (2016) report that all the above mentioned attributes of task characteristics have significant relationships with SECI; suggesting that well designed task characteristics influences the creation of knowledge. In addition, this study also theorizes the causal chain or mediation in which an intervening variable causes mediation in the relationship between the independent and dependent variables. Based on Baron and Kenny's (1986) general analytic considerations, the researcher could assumes that meditational effect is possible when the intervening variable, knowledge creation process, mediates the relationship between task characteristics and innovation. Consequently, knowledge creation process may possibly make the relationship between task characteristics and innovation become stronger.

3.4.2 Knowledge characteristics

Knowledge characteristics refer to the need of certain skill, knowledge or competency in an individual or employee in order for them to conduct their job (Morgeson & Humphrey, 2006). The dimensions of knowledge characteristics are job complexity, information processing, problem solving, skill variety and specialization. Job complexity deals with the level of complexity of the tasks on the job as well as the difficulty level in performing the tasks (Morgeson & Humphrey, 2006). Some research states that job with high complexity level will advance the employee's satisfaction towards their job, but it also might increase their workloads (Humphrey, Nahrgang, et al., 2007). Complex jobs require to be attended by employees with high level-skill. Swart and Kinnie (2003) state that these employees add values by applying knowledge in innovative ways thus cultivate innovativeness in delivering excellent services and sustaining the organisational competitive advantages.

Information processing refers to job that requires attending and processing of numerous active data and information (Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007). Study shows that information processing could enhance the learning and development in the job environment. However, this could also lead to the demand on skill requirement (Morgeson & Humphrey, 2008). Next is the problem solving which refers to the needs of having unique idea or solution to a job related problems (Humphrey, Nahrgang, et al., 2007). Some study also suggests that problem solving involves in generating innovative ideas as well as solving non-routine problems and avoiding errors (Jackson et al, 1993). Problem solving also has similarity with creativity concept. Meanwhile, skill variety is one of the core job characteristics in the Job Characteristics Model (Hackman & Oldham, 1976, 1980). Hackman and Oldham (1980) state that skill variety reflects to the need of acquiring and utilizing several different skills and knowledge in order to perform a job. Although it is rather difficult in utilizing the multiple skills, the need will prompt further interest to perform the skills (Morgeson & Humphrey, 2006). Keursten et al. (2006) claim that acquiring multiple

skills are crucial for competency development which is the focal point of knowledge productivity. Skills are needed to make the knowledge productive. For instance, interaction and social skill helps individual to participate in the knowledge network or communities of practices; reflective skill assists in identifying, obtaining and applying new knowledge while technical skills could guide in improving and innovate product, service or operating procedure (Keursten et al., 2006).

Lastly, specialization is the need of specialized knowledge or skills for job performance or one is involved in performing specialized tasks (Edwards, Scully & Brtek, 2000; Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007). Specialization reflects an individual depth of knowledge and skills. By acquiring a specialized knowledge in a specific area, it could make the job more motivating and engaging (Humphrey, Nahrgang, et al., 2007). Though specialization cultivates efficiency in jobs, there is a risk that narrowly designed job could create boredom and discouragement. Consecutively, the employees are less likely encouraged in developing product or process innovation which may lead towards productivity issues. Similar to task characteristics, the outcomes of knowledge characteristics are associated with job performance and knowledge demands. Thus, there is an enthusiasm to investigate the relationship between knowledge characteristics and knowledge productivity. Additionally, this study also explores the causal chain effect by determining whether the mediating variable, knowledge creation process, is present when looking at the relationship between knowledge characteristics and innovation. In other words, by making knowledge productive, it may serves knowledge characteristics to cultivate innovativeness.

3.4.3 Social characteristics

Social characteristics received less consideration in the study of work design (Morgeson & Humphrey, 2006). However, there are studies that state the significant of relating the social characteristics with the study of job design. Social features such as social interaction influences the condition at workplace as it is related with affirmative mood such as enthusiasm (Humphrey, Nahrgang, et al., 2007; Dere, 2011). Dere (2011) states that interaction related to work purpose, either inside or outside the organisation can provide direct feedback on tasks being carried out. Social characteristics dimensions are social support, interdependence, interaction outside organisation and feedback from others. Social support reflects the prospects of getting support and guidance from others, including from the co-workers as well as supervisors (Karasek et al, 1998; Morgeson & Humphrey, 2006). Social support also includes the opportunities in developing friendship at the workplace (Morgeson & Humphrey, 2006). This could promote a conducive and productive atmosphere at the workplace particularly in a stressful working environment. Social support builds trust within organisational network which may influence the creation of new knowledge.

Interdependence refers to the reliance of the job to others' work and also the dependent of other job on the work of the main job (Humphrey, Nahrgang, et al., 2007). In other words, interdependence reflects the connection of the jobs with other people works. Chung and Jackson (2011) report that high level of task interdependence influences the relationship between employee's trust and knowledge creation while Bligh, Pearce and Kohles (2006) propose that task interdependence could support the relationship between shared leadership and knowledge creation. On the other hand, interaction outside organisation is a work-related interaction and communication between the employee and non-organisational member including supplier, customer or other organisation (Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007; Morgeson & Humphrey, 2008). This social feature could promote a broader social setting (Morgeson & Humphrey, 2008). For the purpose of this study, interaction outside organisation will also involve the communication between non-departmental member and the employee in the same organisation.

Feedback from others takes place when other organisational members provide feedbacks on one's performance or feedback on interpersonal characteristic (Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007; Morgeson & Humphrey, 2008). The source of feedback could be provided by the co-workers and supervisors (Morgeson & Humphrey, 2006, 2008). Provided that the feedback received is accurate and timely, employee that knows what is expected from oneself will likely feel satisfied and motivated on conducting the job (Humphrey, Hollenbeck, et al., 2007).

Wrapping up, while there are literatures on work design recognizing the importance of the social influence towards employees' satisfaction and motivation, studies on the relation to social characteristics and knowledge creation or innovation have received little interest. In addition, this study also hypothesizes causal chain in which social characteristics affect the knowledge creation process that, in turn, affects innovation. The presence of knowledge creation process as mediator that mediates the relationship between social characteristics and innovation may devise innovation more successfully.

3.4.4 Work context characteristics

Work context characteristics include the features from the physical and organisational context. Griffin and McMahan (1994) mention that work context features focus on designing jobs based on physical comfort, physiological concerns and also consider other biological factors in the workplace. In the studies on work design, the dimensions of work context characteristics are ergonomics; physical demands, work conditions and equipment use (Morgeson & Humphrey, 2006). The implementation of the work context characteristics will result in less fatigue physical injuries; hence, this could increase the job satisfaction level and also lower the absenteeism level among the employees. Ergonomics refer to designing the job by taking consideration on the employees' correct movement and appropriate posture (Morgeson & Humphrey, 2006). This includes the seating arrangements, ample working space and any other elements related to physical working conditions. There are few studies on relating the relationship between ergonomics and job satisfaction (Griffin & McMahan, 1994; Edwards et al., 1999; Morgeson & Humphrey, 2006; Dere, 2011). Raghunath (2007) believes that satisfaction towards physical working qualities help to maintain the comfort at workplace and the employees' health and this could lead to increase in productivity.

Physical demands are the extent of physical activity as well as the effort required in conducting the job (Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007; Morgeson & Humphrey, 2008). Physical demands assess the endurance, strength, physical effort and the metabolic demands (Edwards et al, 1999). Work conditions reflect the component of the work environment where a particular job is performed (Morgeson & Humphrey, 2006; Humphrey, Nahrgang, et al., 2007; Morgeson & Humphrey, 2008). Some of the features are temperature, health hazards, noise and cleanliness of the workplace. Few studies have revealed that work condition have positive relationship to job satisfaction (Morgeson & Humphrey, 2008) as well as to the employees' productivity (Hameed & Amjad, 2009). It is reported that workplace surroundings and spatial arrangement are some of the components of work condition that have significant impact on the employees' productivity. Lastly, equipment use refers to the variety of technology and equipment used in performing the job as well as the complexity of the technology and equipment (Morgeson & Humphrey, 2006, 2008) For the purpose of this study, the learn-ability and adequacy of the technology and equipment will also be assessed. Although previous study indicates low impact of equipment use on work outcomes (Morgeson & Humphrey, 2006), this study investigates whether there is relationship between equipment use and knowledge productivity concepts.

Although there are previous literatures on the impact of several work context components toward productivity, it did not focus on assessing the impacts towards knowledge creation or innovation. Moreover, this study also investigates the causal chain effect by determining whether the mediating variable, knowledge creation process, is present when looking at the relationship between work context characteristics and innovation. The work context aspect of job design may support the knowledge creation activities to be more efficient and productive, which in turn, leads to ideas in innovating organizational service and process.

3.4.5 Research hypotheses and conceptual framework

Based on the aforementioned discussion, Table 1 summarizes the hypotheses in the study. The formulated hypotheses help in answering the research questions of this study. The study also proposes a conceptual framework as illustrated in Figure 1 which depicts the relationship between variables that are investigated in this study.

Table 1:*Summary of Research Hypotheses*

No.	Statement of Hypotheses
H1	Knowledge creation process is significantly related with innovation
H2	Task characteristics are significantly related with knowledge creation process
H3	Task characteristics are significantly related with innovation
H4	Knowledge creation process significantly mediates the relationship between task characteristics and innovation
H5	Knowledge characteristics are significantly related with knowledge creation process
H6	Knowledge characteristics are significantly related with innovation
H7	Knowledge creation process significantly mediates the relationship between knowledge characteristics and innovation
H8	Social characteristics are significantly related with knowledge creation process
H9	Social characteristics are significantly related with innovation
H10	Knowledge creation process significantly mediates the relationship between social characteristics and innovation
H11	Work context characteristics are significantly related with knowledge creation process
H12	Work context characteristics are significantly related with innovation
H13	Knowledge creation process significantly mediates the relationship between work context characteristics and innovation

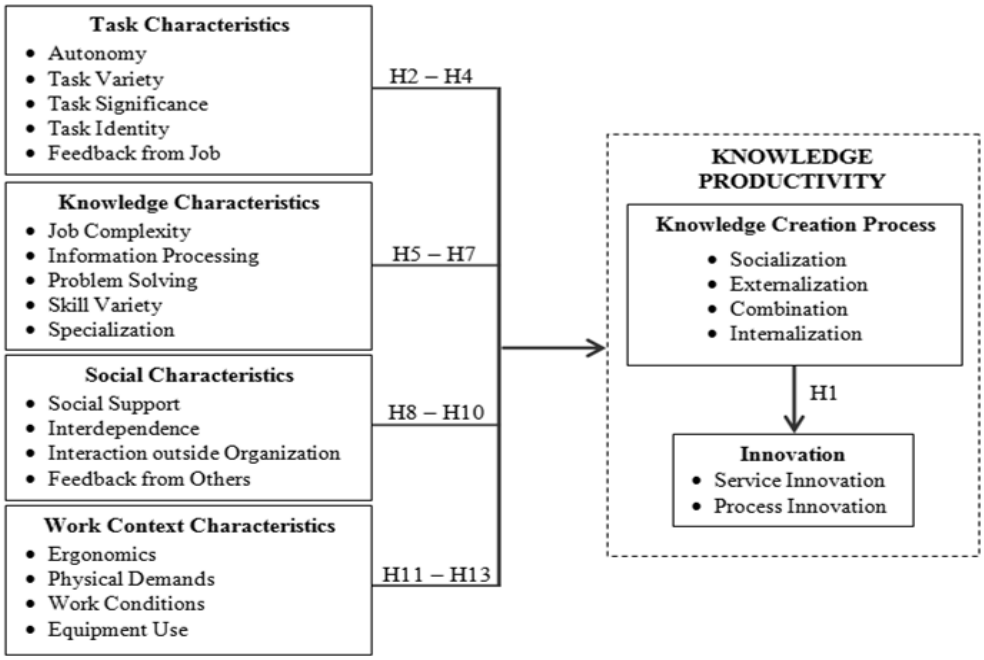

Figure 1: The Enhanced Research Model

4.0 RESEARCH METHODOLOGY

The study employed the quantitative survey research method. Twenty-one federal ministries in Putrajaya were involved in the study. Aside from the literature reviews, preliminary study were undertaken to help the study to be more parallel with the real world phenomenon. The preliminary study has also enriched the researcher's perceptive on knowledge worker and their knowledge productivity in the context of the PTD's work settings. Most importantly, the findings obtained from the field of study were used to revise the research problems, research objectives, hypotheses and also the conceptual framework. Accordingly, the study carried out a self-administered paper-and-pencil survey, using questionnaire as the survey instrument. The questionnaire items were measured using a Likert scale anchored at 1 for "Strongly Disagree" to 7 for "Strongly Agree". The questionnaire had undergone several pre-testing sessions with several field experts and prospective respondents to ensure its quality and accuracy. Furthermore, it was also pilot tested with 36 officers. In assessing the reliability of the questionnaire, the internal consistency reliability using the Cronbach's alpha method was adopted. Table 2 shows the detailed Cronbach's alpha scores for the pilot study. None of the measures have Cronbach's alpha value below the minimum level of 0.6; suggesting that the measures were considered acceptable to be used for further analysis.

Based on proportionate stratified random sampling technique, 548 questionnaires were distributed to a population which consisted of the PTDs working in the federal ministries in Putrajaya. Each selected respondent was given about two weeks to respond to the distributed questionnaires. A total of 421 questionnaires was returned in a staggered manner over a period of ten weeks. This represents a response rate of 76.8 %, which is considered high rate compared to other related studies in an organisational settings. Several editing and data cleaning practices were taken in determining the usability of the returned questionnaires and as a measure in balancing the quality of the data. Invalid questionnaires including the partially or unanswered returned questionnaires and responses that were identified with intentional "straight-lining" and "Christmas-tree" patterns were excluded. Altogether, 305 questionnaires are usable; yielding to a total usable rate of 55.66%. This

exceeds the required sample size of 259 as suggested by Bartlett, Kotrlik and Higgins (2001).

After completing the data collection process, the data were prepared before embarking on the data analysis procedures. This is necessary in obtaining an accurate and valid survey findings. The researcher is convinced to use the parametric statistical procedures in accordance to the Central Limit Theorem (CLT). The Predictive Analytics SoftWare (PASW) version 18 was engaged to analyze the data. The study performed the descriptive and inferential statistical tests including the descriptive analysis, factor analyses, reliability analysis, correlation analyses, linear regressions and multiple regressions analyses. The results from the statistical analyses were applied to confirm the formulated hypotheses in this study. Lastly, this study concluded by highlighting the main findings in fulfilling the research objectives, the study's contribution, limitations and further opportunities.

Table 2:*Reliability of Instrument Measures based on Pilot Study*

	Measures	**Cronbach's Alpha**
Knowledge Creation Process	Socialization	0.649
	Externalization	0.854
	Combination	0.864
	Internalization	0.931
	Overall	**0.932**
Innovation	Service Innovation	0.946
	Process Innovation	0.922
	Overall	**0.951**
Task Characteristics	Work Scheduling Autonomy	0.673
	Decision Making Autonomy	0.821
	Work Methods Autonomy	0.847
	Task Variety	0.685
	Task Significance	0.843
	Task Identity	0.872
	Feedback From Job	0.834
	Overall	**0.910**
Knowledge Characteristics	Job Complexity	0.676
	Information Processing	0.826
	Problem Solving	0.820
	Skill Variety	0.875
	Specialization	0.840
	Overall	**0.919**
Social Characteristics	Social Support	0.789
	Interdependence	0.709
	Interaction outside Organization	0.881
	Feedback from Others	0.761
	Overall	**0.833**
Work Context Characteristics	Ergonomics	0.910
	Physical Demands	0.956
	Work Conditions	0.733
	Equipment Use	0.848
	Overall	**0.860**

5.0 FINDINGS

Table 3 presents the demographic profile of the respondents. Out of 305 respondents, 51.1% were female and the remaining 48.9% were male. With regard to the respondents' age, the highest percentage was aged between 30 and 34; while the lowest percentage was aged less than 25 years. Other than this, some 215 or 70.5% respondents are married; outnumbering the "Single" status respondents. In terms of the respondents' education level, the highest percentage, i.e. 75.7% possesses a Bachelor's degree while the remaining 24.3% hold a Masters degree. Lastly, with regard to the respondents' length of service as PTD, 161 of the respondents have been working for 1 to 5 years which represent 52.8% of the overall percentage; while only 3.0% or 9 have been working for more than 20 years.

Table 3:*Demographic Profile of Respondent*

	Variable	**Freq**	**Percent (%)**
Gender	Male	149	48.9
	Female	156	51.1
Age	Less than 25 years	3	1.0
	25-29 years	97	31.8
	30-34 years	109	35.7
	35-39 years	56	18.4
	40-44 years	20	6.6
	45-49 years	10	3.3
	50 years and above	10	3.3
Marital status	Single	89	29.2
	Married	215	70.5
	Other	1	0.3
Highest education level	Bachelor degree	231	75.7
	Masters degree	74	24.3
Length of service	1-5 years	161	52.8
	6-10 years	99	32.5
	11-15 years	23	7.5
	12-20 years	13	4.3
	More than 20 years	9	3.0

In order to reduce any biasness in the dataset due to external influences to the measures, this study executed the Harman's single factor test to point out the presence of a significant amount of common method variance if a single factor accounts for more than 50% of the covariance of the independent and dependent variables (Eichhorn, 2014). Fortunately, the result revealed that the Harman's single factor test estimated the common method variance to be only 24.887%, hence signifying that the collected data is free from the threats of common method variance. Other than this, factor analysis was conducted to disclose any underlying latent variables in a set of items. 110 items measuring the dependent and independent variables were entered into the Principal Axis factoring with Varimax rotation. The results showed that most items were cleanly loaded onto the conceptualized variables. Reliability analysis was again executed based on the factor analysis' outcomes and the result indicated that the Cronbach's Alpha surpassed the cut off value of 0.7.

Table 4 illustrates the descriptive analysis of variables for the study. The mean scores of the entire variable stated well above the mid value (i.e. the middle value of the Likert scale is 4), suggesting that in general, the respondents were favourably inclined to agree in participating

in knowledge productivity practices; which compromised of two variables, i.e., knowledge creation process and innovation It was also revealed that the respondents tended to express favourable agreement towards all the dimensions of job design characteristics; namely task characteristics, knowledge characteristics, social characteristics and work context characteristics.

Table 4:*Descriptive Analysis of Variables*

	Average scores			
Items	**Mean**	**Std Error**	**Std Deviation**	**Variance**
Knowledge Creation Process	4.65	0.087	1.522	2.360
Innovation	4.61	0.074	1.288	1.672
Task Characteristics	5.32	0.068	1.188	1.431
Knowledge Characteristics	5.43	0.065	1.128	1.284
Social Characteristics	5.19	0.070	1.211	1.480
Work Context Characteristics	4.87	0.073	1.269	1.656

Bivariate regression analyses were conducted in answering nine of the formulated hypotheses on determining the significant relationships between the dependent variables, namely the innovation and knowledge creation process; and also between the dependent variables and independent variables, specifically the task characteristics, knowledge characteristics, social characteristics and work context characteristics. Table 5 and 6 highlights the results of the regression analysis between knowledge creation process and innovation as the formulated hypothesis H1. The finding revealed that knowledge creation process significantly related to innovation of PTDs (r^2 = 0.543, F = 316.929, p < 0.001). H1 is therefore supported.

Table 5: *Model Summary of Linear Regression Analysis between Knowledge Creation Process and Innovation*

R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
0.737	0.543	0.541	0.70332

Table 6: *Result of Linear Regression Coefficient and F statistic for Knowledge Creation Process from Innovation*

	Unstandardized Coefficients		**Standardized Coefficients**			
	B	**Std. Error**	**Beta**	**t**	**Sig.**	**F**
(Constant)	1.067	0.201		5.307	**0.000**	**316.929**
Knowledge Creation	0.757	0.043	0.737	17.802	**0.000**	

Table 7 and 8 highlights the results of the regression analyses between knowledge creation process and job design characteristics. The regressions predicting knowledge creation process from job design characteristics are statically significant as the “Sig” is less than .05; which implied that all four job design characteristics have significant relationships with knowledge creation process. Thus, the hypotheses H2, H5, H8 and H11 are fully supported.

Table 7: *Model Summary of Linear Regression Analysis between Knowledge Creation Process and Job Design Characteristics*

Predictors	R	R Square	Adjusted R Square	Std. Error of the Estimate
Task Characteristics	0.441	0.194	0.191	0.91847
Knowledge Characteristics	0.377	0.142	0.139	0.95175
Social Characteristics	0.422	0.178	0.175	0.92718
Work Context Characteristics	0.392	0.154	0.151	0.93999

Table 8: *Result of Linear Regression Coefficient and F statistic for Knowledge Creation Process from Job Design Characteristics*

	Unstandardized Coefficients		Standardized Coefficients			F
	B	Std. Error	Beta	t	Sig.	
(Constant)	1.627	0.373		4.365	**0.000**	**67.243**
Task Characteristics	**0.570**	0.069	0.441	8.200	**0.000**	
(Constant)	1.856	0.412		4.505	**0.000**	**46.386**
Knowledge Characteristics	**0.510**	0.075	0.377	6.811	**0.000**	
(Constant)	1.343	0.437		3.076	**0.002**	**57.763**
Social Characteristics	**0.636**	0.084	0.422	7.600	**0.000**	
(Constant)	1.894	0.389		4.873	**0.000**	**51.310**
Work Context Characteristics	**0.566**	0.079	0.392	7.163	**0.000**	

Table 9 and 10 highlights the results of the regression analyses between innovation and job design characteristics. Similarly, the analyses revealed that job design characteristics are indeed statistically related to innovation. Thus, the hypotheses H3, H6, H9 and H12 are fully supported.

Table 9:*Model Summary of Linear Regression Analysis between Innovation and Job Design Characteristics*

Predictors	R	R Square	Adjusted R Square	Std. Error of the Estimate
Task Characteristics	0.380[a]	0.144	0.141	0.96235
Knowledge Characteristics	0.307[a]	0.094	0.091	0.99506
Social Characteristics	0.405[a]	0.164	0.161	0.94439
Work Context Characteristics	0.406[a]	0.165	0.162	0.94028

Table 10:*Result of Linear Regression Coefficient and F statistic for Innovation from Job Design Characteristics*

	Unstandardized Coefficients		Standardized Coefficients			F
	B	Std. Error	Beta	t	Sig.	
(Constant)	1.987	0.394		5.036	**0.000**	**44.702**
Task Characteristics	**0.490**	0.073	0.380	6.686	**0.000**	
(Constant)	2.284	0.438		5.216	**0.000**	**27.828**
Knowledge Characteristics	**0.419**	0.079	0.307	5.275	**0.000**	
(Constant)	1.275	0.474		2.692	**0.008**	**49.845**
Social Characteristics	**0.639**	0.091	0.405	7.060	**0.000**	
(Constant)	1.731	0.395		4.383	**0.000**	**53.414**
Work Context Characteristics	**0.587**	0.080	0.406	7.309	**0.000**	

As all the above mentioned hypotheses are accepted, the study proceeded with the mediation analysis using the Causal-Steps Test as observed by Judd and Kenny (1981) as well as Baron and Kenny (1986) in examining the significance of the coefficient and in determining the existence of mediating relationship. Comparing between Table 10 and Table 11, it can be observed that the regression coefficient (B) for the four job design characteristics reduced when knowledge creation process is added to the regression, suggesting that knowledge creation process may be exerting a partial mediating effect. To complete the analysis, the Sobel (1982) test was also used to statistically investigate the significance of the indirect effect between the proposed mediator on the independent variables and dependent variable relationship. Table 12 exhibited the result of the Sobel's mediation analysis. All the *p* value are less than 0.05 indicated that the knowledge creation process mediated the relationship between job design characteristics and innovation; thus the hypotheses H4, H7, H10 and H13 are well supported.

Table 11:*Result of Multiple Regression Coefficient for Innovation on Knowledge Creation Process when Controlling for Job Design Characteristics*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Task Characteristics	**0.087**	0.060	0.068	1.448	0.149
Knowledge Creation	0.729	0.048	0.708	15.166	**0.000**
Knowledge Characteristics	**0.059**	0.061	0.043	0.963	0.336
Knowledge Creation	0.744	0.046	0.723	16.081	**0.000**
Social Characteristics	**0.198**	0.072	0.126	2.739	0.007
Knowledge Creation	0.705	0.047	0.689	14.934	**0.000**
Work Context Characteristics	**0.204**	0.065	0.140	3.150	0.002
Knowledge Creation	0.695	0.046	0.680	15.260	**0.000**

Table 12:*Sobel Test of Mediation Results*

	Test statistics (*Z*)	**Sobel's Std. Error**	***p*-value**
Task Characteristics	7.257	0.057	**0.000**
Knowledge Characteristics	6.269	0.061	**0.000**
Social Characteristics	6.759	0.066	**0.000**
Work Context Characteristics	6.474	0.061	**0.000**

Additionally, this study conducted statistical analysis to determine the strongest predictors among the variable investigated using the stepwise multiple regressions. Table 13 and Table 14 exhibited the result of the analysis. The result revealed that task characteristics, social characteristics and work context characteristics were significant predictors of the knowledge creation process. About 25.8% of the variation in knowledge creation process was accounted for these three variables.

Table 13:*Model Summary of Stepwise Multiple Regression and F statistic between Predictors and Knowledge Creation Process*

Predictors	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F**
Task Characteristics	0.446	0.199	0.196	0.91640	61.651
Task Characteristics, Work Context Characteristics	0.489	0.239	0.233	0.89510	38.782
Task Characteristics, Work Context Characteristics, Social Characteristics	0.508	0.258	0.249	0.88538	28.577

Table 14:*Coefficients*[a] *of Stepwise Multiple Regression between Predictors and Knowledge Creation Process*

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.642	0.389		4.222	0.000
Task Characteristics	0.567	0.072	0.446	7.852	0.000
(Constant)	0.753	0.453		1.662	0.098
Task Characteristics	0.435	0.080	0.342	5.472	0.000
Work Context Characteristics	0.325	0.090	0.225	3.598	0.000
(Constant)	0.258	0.489		0.529	0.598
Task Characteristics,	0.331	0.089	0.260	3.733	0.000
Work Context Characteristics	0.257	0.093	0.178	2.756	0.006
Social Characteristics	0.267	0.105	0.179	2.541	0.012

Similarly, following the regression analysis, only three characteristics turned out to be the strongest predictors of innovation as shown in Table 15 and Table 16. The stepwise multiple regression had omitted knowledge characteristics from the analysis. The remaining variables i.e. social characteristics, work context characteristics and task characteristics explained about 22.5% of the variation for innovation.

Table 15:
Model Summary of Stepwise Multiple Regression and F statistic between Predictors and Innovation

Predictors	R	R Square	Adjusted R Square	Std. Error of the Estimate	F
Social Characteristics	0.397[a]	0.158	0.154	0.95095	44.392
Social Characteristics, Work Context Characteristics	0.452[b]	0.204	0.198	0.92628	30.290
Social Characteristics, Work Context Characteristics, Task Characteristics	0.474[c]	0.225	0.215	0.91609	22.738

Table 16:*Coefficients[a] of Stepwise Multiple Regression between Predictors and Innovation*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.397	0.487		2.872	0.004
Social Characteristics	0.619	0.093	0.397	6.663	0.000
(Constant)	0.571	0.524		1.091	0.276
Social Characteristics	0.443	0.102	0.284	4.330	0.000
Work Context Characteristics	0.356	0.096	0.244	3.714	0.000
(Constant)	0.331	0.527		0.629	0.530
Social Characteristics	0.311	0.114	0.200	2.734	0.007
Work Context Characteristics	0.292	0.098	0.200	2.974	0.003
Task Characteristics	0.232	0.093	0.182	2.506	0.013

6.0 DISCUSSION

This study presents practical contributions to understand the knowledge productivity among the PTD in the Malaysia's Federal Ministries. Following the statistical analyses' findings, it were revealed that the knowledge productivity among the PTD in the Malaysia's Federal Ministries is no difference as practised by other knowledge workers in the private sectors or in any other countries as reported in the literature. All thirteen formulated hypotheses are fully supported. The findings indicated that the PTDs are indeed involved in the majority of the activities representing the dimensions of knowledge creation processes measured in terms of socialization, externalization, combination and internalization. The results imply the significance of exercising the knowledge creation abilities in creating new knowledge for the benefits of Malaysian Federal Ministries. This is essential for the development of new public service and work process. Socialization scored the highest involvement, followed by internalization, combination and externalization.

With regards to innovation, this study emphasizes on the service innovation and process innovation among the PTDs. Similarly, the findings also show that the PTDs are engaged in activities that promote towards innovativeness in both service innovation and process innovation. While the PTDs are involved in introducing or improving services to satisfy the public's needs and trends, they also concentrate in seeking new competencies or techniques in delivering significantly improved services, which includes changes in management strategies, practices and work procedures. These process innovations could help in reducing

the work load of the PTDs and improve the public's ability to access the services to be provided more efficiently.

Furthermore, operationalizing the term knowledge productivity as the process of knowledge creation that leads to service and process innovation, this study investigates the relationship between knowledge creation process and innovation. The findings of this study fully support the previous studies. The knowledge creation process indeed are significantly related to innovation. It guides innovation to improve its efficiency and to create value. For example, novel knowledge can be created through social interactions among colleagues, team members or with the internal and external experts, and in this manner boosts the PTDs' capabilities to innovate. This also gives the PTDs opportunity to share their knowledge and assist in solving problems related to services and processes in their respective ministry. Proactive discussion with the public also helps the PTD to identify new services or products required by the public. Further action in documenting the findings from the discussion is also considered as the basis in generating innovative ideas. These reports, documents, training materials or seminars papers make available any necessary data or information on which new knowledge could be built. The accessibility to available organisational knowledge give the PTD an additional advantage to kick off new development in improving the existing services or work processes. Subconsciously, through reaching and reading the existing organisational knowledge, the PTDs have added new operational knowledge to increase their own competencies which in turn assist in producing novel innovative solutions. Hence, undoubtedly, knowledge creation process strongly supports the innovation initiatives

Furthermore, this study adapts and assesses the job design characteristics as the factors that may influence the PTD's knowledge productivity. Addressing the relationship between job design characteristics and knowledge productivity, the job design characteristics are examined against two dimensions of knowledge productivity which are knowledge creation process and innovation. Parallel with the existing studies, the findings of this study have statistically shown that the job design characteristics namely the task characteristics, knowledge characteristics, social characteristics and work context characteristics are indeed the factors that influence the knowledge creation process that the PTDs are involved in. Further analyses discovered that out of the four characteristics, task characteristics, social characteristics and work context characteristics were the strongest predictors of the PTDs' knowledge creation process. The analysis had omitted the knowledge characteristics as it may not be a good predictor for knowledge creation process.

The dimensions of task characteristics include the three aspects of autonomy, namely work scheduling autonomy, decision making autonomy and work methods autonomy; task variety, task significance, task identity and feedback from job. The results from the analysis make it clear that public administration considers the core job design dimensions when designing the PTD's job and thus, it has helped the PTDs to be more productively involved in the knowledge creation processes. Meanwhile, the dimensions of knowledge characteristics include job complexity, information processing, creative problem solving, problem solving, skill variety and specialization. As clearly stated in their job scope, the PTDs acknowledged that their jobs are indeed complex and consist of complicated tasks. Though it may increase their workload, complexity gives the PTD the opportunity to utilize various skills and expertises while performing their work activities. Taking advantage of their university qualifications and additional trainings, the PTDs could harness their own personal knowledge productive by generating novel and unique solutions or ideas in tackling job-related problems. Accordingly, this study also revealed that the social characteristics consisting social support, interdependence, interaction outside organisation and feedback from others also are the factors that influences the PTDs' knowledge creation process. The PTDs agree that their job gives them the opportunities to develop networks with their colleagues, superiors and non-members of their ministry. This promote a supportive and

productive atmosphere at the PTDs' workplace. It also builds trust within the organisational network which influences the creation of new knowledge. The PTDs also have more exposures in learning to carry out their job more efficiently through the exchange of knowledge while interacting with between non-departmental members in the same workplace as well as non members outside the ministry. Lastly, the dimensions of work context characteristics namely ergonomics, physical demands, work conditions and equipment use are also significant with knowledge creation process. The PTDs agree that their workplace surroundings and spatial arrangement are some of the components of work conditions that have significant impact on the their productivity. Work conditions could affect the PTDs moods or emotional needs as well as motivation in conducting their tasks. Furthermore, as the PTDs spend majority of their time at their workplace, their ergonomics features are also important in preventing uncomfortable work posture that may lead to serious health issues. Uncomfortable and inhospitable working arrangement could hamper the PTDs' efficiency level considerably which results in low level of involvement in knowledge creating activities.

Similarly, the findings revealed in the descriptive profiles indicate that the PTDs have acknowledged the existence of the job design characteristics that influence their innovation abilities. Upon conducting the statistical analyses, the result indicates that job design characteristics are indeed the factors that influence the PTDs' innovation abilities. Further analyses have discovered that out of the four characteristics, social characteristics, work context characteristics and task characteristics have been the strongest predictors of the PTDs' innovation. Malaysian government has realized the need in improving its innovations and governance as globalization continues to serve serious challenges for Malaysia. Accordingly, many new products and services were introduced to the public as well as enhancement on the current government policies and procedures. Mostly, these innovations are practically the efforts of the PTDs. Motivating the PTDs is critical as it can increase their capability and performance to be innovative and creative. The results of this study have confirmed that the characteristics of job design can promote the innovation ability of the PTDs. For instance, the dimension of task characteristics such as task variety can provide the PTDs with mixture of mentally as well as physically challenging tasks that benefit them to be equipped with various skills that are crucial for innovation. Task significance in turn aids the PTDs to value how their job impact the lives or the works of others, whether within the ministry or the public. This indeed promotes dedication towards their own job in delivering efficient services. Meanwhile, linking with the attributes of knowledge characteristics, the PTDs, as a knowledge worker, are generally in-charge of the processes of innovation development such as planning, obtaining, identifying, organizing, programming, promoting and other complex tasks that often require them to monitor numerous information and to be engaged in critical thinking situations in order to produce knowledge based results in the form of services, products or process. Equivalent to their academic qualifications and also experiences, the PTDs possess the knowledge and capability that can be exploited in various situations or problems in performing their tasks. They could add values by applying knowledge in innovative efforts which in turn cultivate innovativeness in delivering excellent services and sustaining the ministry's strengths. Besides, the PTD's competencies in obtaining and utilising the knowledge in making strategic decisions represent a ministry's capability in producing significant results. From the social characteristics aspects, the PTDs could also join forces with individual or experts from internal and external links and solve problems collaboratively. By combining expertises, knowledge and skills from various people and aspects, it could fuel the PTDs' competencies in learning and innovating at their workplace. It also helps in pushing the PTDs to think outside the box and beyond their routine tasks in a way that can stimulate their innovativeness. Other than this, as the PTDs seem to be dealing with complex tasks, they are required to possess various skills in order to formulate a sustainable innovation. Skills are also important while innovating the administrative processes as it could help in reducing the workload of the PTDs that distracts

them from prospering their innovative capabilities. Additionally, the PTDs physical and organisational conditions influences their desire to innovate. Through their workplace environments, the PTDs could see and sense their level of significance and attachment to their respective ministry which in turn enhance the dedication towards their job. Work condition is a dimension of work context characteristics of job design. Some of the features such as temperature, health hazards, noise and cleanliness of the workplace have significant impact on the PTDs' productivity. Other than this, varieties of technology and equipment used in performing a job assist in the process on innovation development. In order to enhance the quality of existing public service delivery, the PTDs have adopted and adapted to various technological changes in their effort to transform operational procedures and processes. The implementation of technologies such as internet, intranet, system triggers the PTDs innovative capabilities in improving public service facilities.

Other than the abovementioned findings, the analyses have empirically answered and confirmed that knowledge creation process also significantly mediates the relationship between task characteristics, knowledge characteristics, social characteristics and work context characteristics and innovation. Thus, it can be said that knowledge creation process make the relationship between the characteristics of job design and innovation become stronger. The primary source of knowledge is always from the employees' brain; in the context of this study, the PTDs. Their respective ministry needs to have a strong relationship with the PTDs and engaged them in proactive knowledge creation activities which will help in acquiring and manipulating the PTDs knowledge in producing value on the well-being of the public. On top of this, by identifying the factors that support the PTDs' knowledge creation and innovation abilities, in this case, the job design characteristics, it directly or indirectly influences the manner the PTDs carry out their responsibilities and tasks, especially in increasing their work productivity. For instance, in a situation where the PTDs are involved in an innovation development processes, knowledge and ideas are generated from the combination of internal and external sources. After functional ideas are identified and selected, the PTDs will then manipulate them to develop a product or service or process. However, without proper job design characteristics such as social support, feedback, skills, interaction or even suitable equipment, the development and implementation of the innovation will not succeed. It is also known that the PTDs are involved in various complex tasks, engaged in problem-solving and continuously learning new ideas in delivering efficient services to the public. In addition, by involving in varying tasks, the PTDs are able to grasp new perspectives to boost their capabilities in improving and innovating existing procedures and services.

7.0 CONCLUSION

This study aims to explore the job design theory by investigating the possible task, knowledge, social, and work context characteristics that may influence the PTDs' knowledge productivity. To achieve this purpose, an empirical based framework mainly drawn from previous studies has been developed. The results of the analyses supported all thirteen hypotheses of the study. The contribution of the study should capture the interest of both researchers and practitioners as it further enriched the body of knowledge in the context of knowledge productivity. The main contribution of the study is the establishment of an empirically validated based framework that depicts the relationship between job design characteristics as the factors of knowledge productivity. This study has provided qualified support to further strengthen the models and frameworks upon which the research framework has been built upon. Furthermore, the study also developed a survey instrument consists of general measures which could also be used in different research settings. The instrument could help in identifying the job design characteristics that contribute in supporting the knowledge productivity. The identified characteristics could be emphasized in

creating a dynamic and productive working environment for the knowledge workers and also in cultivating innovation in creating value.

Though this study successfully fulfilled its research objectives, it is still subject to few limitations. Firstly, this study does not aim in measuring the knowledge productivity (the ratio of productivity). It is intended to identify the contributing factors of knowledge productivity with regards to knowledge creation process and innovation among the PTDs. Hence, future study should grab the opportunity to study the knowledge productivity by measuring the knowledge based results of knowledge productivity. Secondly, this study narrowed its scope by studying solely on the job design characteristics. Though it already consists of the most comprehensive set of up-to-date job design characteristics, there are other factors that are mentioned in the previous studies which could be relevant and applicable in the research setting. Thus, besides job design characteristics, future study should also investigate other factors that may influence the knowledge productivity. Lastly, this study did not distinguish between the four modes of knowledge creation process in terms of its relation with the services or processes innovation. Apparently, it is also worthy if future study could identifies the impact of each four modes of knowledge creation process against each type of innovation.

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