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ICT in Business and Public Sector

Time Pressure and Creativity of Programmer,
a case study at Perusahaan Listrik Negara
(Indonesia's State Electricity Company)

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MASTER'S THESIS

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Table of Contents

List of Figures

List of Graphs

List of Tables

List of Charts

Abstract

Elsewhere in the professional practices, programmers tend to be involved in every role in software development project as analysts, designers, programmers, even as testers which are not common practices due to the lack of resources. Having insufficient time to fulfil all the requests in completing a project because of time pressures and workload are a perceived problem. Moreover, very pressured situations even lead to health problems. On the one hand, the management realises these situations are unavoidable driven by the dynamic of projects which must meet a given delivery time. Programmers are then required to be creative because they are also responsible for translating all related information, demands and complexities into the simplest procedures and algorithms with friendly displays which may go beyond their job descriptions.

This research investigates how much time pressure is experienced by programmers and at which level it is considered as maximum in government companies. The relationship between time pressure and creativity is correlated using a quantitative approach by examining a cross section of thoughts, experiences and workload conditions. Correlation analysis of the number of working days in a week, number of tasks and amount of pressure on the programmer's creative cognitive processing, which is a dimension of creativity, showed a negative correlation. With Pearson's r, a Sig. (2-tailed) coefficient value of -0.313, $p < 0.05$, it may be concluded that greater time pressure is correlated to lower creativity. Other dominant influence factors such as age, working experiences and the working place are also presented in the detailed discussion. This research ends with conclusions and recommendations for the best level of time pressure at which management should impose to achieve the most creative ideas from programmers.

Keywords: *Time Pressure, Creativity, Programmer, Creative Cognitive Processing, Workload*

Chapter I. Introduction

1.1 Problem Statement & Research Aim

Time and its impact for businesses have been general ongoing issues (Covey, 1994; Oncken, and Wass, 1974). There is a perception that a logical time approach is the desire to compress it in order to generate more profits. Adam has argued "when time is money, then faster means better" (Adam, 2003). There is no firm expectation that people will do what they are paid to do. Due to the lack of resources, programmers are involved in every role in software development projects as analysts, designers, programmers and even testers (Mubin, 2017). This is normal and works well; however, in some cases, things may go wrong. There is a limit on how much people are able to handle and this limit differs for each person. When employees exceed the limit, and cannot solve a problem on their own, this situation is known as a work pressure problem ("Working under pressure: ?!," 2000).

In an organisational context, pressure is seen and felt ordinary matter in working environment. Particularly in IT development projects, the main issue is always time, while the budget can always be adjusted through bargaining to accelerate and finalise the project by the requested time (Richard, 2017). Pressure can be manifest in deadlines which mostly experienced by programmers in corporations (Bowrin & King, 2010; Hazzan & Dubinsky, 2007; Khomh, 2012; Nordqvist, Hovmark, & Zika-Viktorsson, 2004). Interestingly, in the software development life cycle, programming is the most pressured phase to be finished early because it is the only phase that a programmer does independently (Richard, 2017). Other phases such as analysis, design and testing phases always have a relationship with people outside the development team i.e users, business process owners, etc. Hence, time restrictions are only lightly applied.

Despite in profit oriented companies, in non profit organization i.e. research laboratory, hospital and academic institution, time pressure can also be perceived in a positive or negative manner. Several researches have been conducted in such organisations to investigate the effect of time pressure. Time pressure was positively predicted to have effect on several aspects of performance of the scientists in the NASA laboratory in the 1960s (Andrews & Farris, 1972). Time pressure influenced Italian university students' expectations of a good grade (Paola & Gioia, 2015). Time pressure detracted from the job, career and specialty satisfaction of physicians in United States (Linzer et al., 2000). However, from the literature review, the researcher has not found any research related to time pressure in government companies where profit is may not the first priority. Characteristics of decision making, employees and facilities in government companies are distinct compared to private companies in general. The work hours, break times, over-time and number of vacation days as well as hiring approvals, performance reviews, and disciplinary actions are eventually controlled not by the employees' supervisors, but by the government (Turney, 2009). It is interesting to be analysed

whether programmer in government companies also perceived time pressure and how is the time pressure condition applied in these companies.

Large government companies generally perform high-speed strategy project implementation (Sumantri, 2017). Particularly, in the area of software development, the projects conducted are based on government policy. Thus, in general, the delivery times for a project requested either from an internal or external company are commonly determined without considering time estimations from the software analyst.

Then the question arises, how big is the pressure in a government company? Does the management truly realise the situation? Hence, the first research question for this research is:

How much time pressure is experienced by programmers in government company? The second research question follows the first research question to address the maximum limit of a programmer's capability in handling a task.

What level of time pressure do programmers consider the maximum? To measure the first and the second research questions, the researcher needed to classify the level of time pressure for programmers who work in government companies. Prior to that, the operational definition of each level of time pressure should be clearly specified.

Furthermore, the request for more creative thinking is never ending, leading to renewed company business processes and upgrades to new technology. It is also expected in programming activities. As has been mentioned by (Knobelsdorf & Romeike, 2008), programming activities are perceived as creative and autonomous. Not only are programmers required to do programming activities, they are essentially required to be creative, especially those who work in big companies to integrate existing applications with others to develop newly requested applications (Sumantri, 2017). On the other hand, programmers are also responsible for translating all related information, demands and complexities into the simplest procedures and algorithms with friendly displays which may be beyond their job descriptions (Mubin, 2017). When there is a time restriction, complying with the requirements is a priority rather than creating additional features beyond the requests. According to (Ben Zur & Breznitz, 1981) that people spend less time on individual items of information when working under time pressure. They added that people refine the information to reach decisions by focusing only on important information and neglecting unnecessary information. Under time pressure people deliberately neglected the difficult parts of the work and undertook the easier parts even though this led to criticism (Katz & Kahn, 1966). However, it is perceived by some programmers that they feel lazy to be creative and only focus on the deadline (Richard, 2017; Kusumaningrum, 2017; Rizal, 2017; Kumalasari, 2017). Time pressure may influence the cognitive load of people in processing information (Ben Zur & Breznitz, 1981). Hence it is assumed that the creativity process

will be distracted due to time pressure, where the cognitive is central to creativity (Teresa M. Amabile et al., 2002). As has also been mentioned by Wallas and Leonard, the Incubation Phase in creative processing has a strong relationship to time whereas time is needed to elaborate alternative ideas (Laeonard & Swap, 1999; Wallas, 1926).

Hence the third research question is:

What is the relationship between time pressure and a programmer's creativity? Based on the research carried out by (Teresa M. Amabile et al., 2002), time pressure and creativity are negatively correlated or, in other words, the more time pressure the less creative ideas will be produced; the researcher intended to investigate whether this negative relationship can also be applied to programmers.

When the productivity of a programmer is hampered by time pressure, further impacts such as the influence on the current project, corporate performance, customers'/users' satisfaction with the application, and the project going over budget shall be anticipated. The appropriate pressure should be applied to optimise the best expected results. In detail, management needs to understand what level of pressure is best to retain the creativity of the programmer.

This topic is worth discussing since work pressure is a problem that concerns employees and management, and both have an interest in dealing with it.

1.2 Research Approach

With reference to some literature on similar subjects of research, the researcher has chosen to use a deductive case study to confirm or reject a set of hypotheses.

This research was carried out in Perusahaan Listrik Negara (PLN) in Indonesia. The researcher selected PLN because it is one of the biggest state-owned company in Indonesia with more than 46,000 employees. This company has a dedicated IT Division with permanent programmers and a subsidiary company dominated by programmers focusing on software engineering services. Considering the size and type of company and also the number of programmers, this company is sufficient to represent similar major companies in Indonesia as the object of this research. Moreover, this research was carried out in Indonesia to study the characteristics of the programmers when working under pressure in a developing country. The closeness of the case-study to a real-life situation and the resulting wealth of information are necessary to develop the reality of the conditions and to deeply understand human behaviour that is sometimes grasped only at the lowest levels of the learning process (Flyvbjerg, 2006).

In the PLN's organisational structure, the STI Division is under the authority of the Financial Directorate. Led by a head of division, STI has five senior managers who are responsible for Information Technology Architecture and Planning, Information Technology Service Control,

Information Technology Application Development, Information Technology Management Application, and Information Technology Management Infrastructure. The researcher found and identified the research problem in the programmers´ workplace. Referring to the source of the problem which appeared to come only from the programmers, the researcher tried to achieve a balanced perspective by making enquiries of the manager in order to control subjective basis.

Being categorised as a large-scale company with €13 billion annual revenue, €1327 trillion worth of assets operated by 46.222 employees and providing electricity for 56 million households and businesses all over Indonesia (Persero, 2017), PLN is required by the government to improve their performance by being fully involved in the 35.000 Mega Watt project from 2015-2019. The project's objective is to support the government's target in obtaining Indonesia's 99% electricity ratio by 2019 by building several power plants and improving transmission networking. Previously, PLN's image in the public was not really satisfying; PLN suffered from a severely negative image as: not a reliable company; having a power deficit which resulted in power outages for customers particularly in west Indonesia and east Indonesia, needing subsidies from the consumer due to corporate inefficiency, having a complicated bureaucracy and complex service procedures. Realising such external circumstances, PLN encountered big challenges to improve their performance by changing their internal and external business strategy. Thus, every activity leading to inefficiency must be a management concern including the issue of perceived time pressure on programmers.

1.3 Research Significance

1.3.1 Academic Relevance

Most research about time pressure, creativity and the relationship between them is believed to have a strong correlation with social-human-related studies: decision-making processes, problem-solving, analytical behaviour and individual quality performance (Teresa M. Amabile, 1997; Teresa M. Amabile et al., 2002; Ben Zur & Breznitz, 1981; Kelly, J. R., Jackson, J. W., & Hutson-Comeaux, 1997; Khan, Brinkman, & Hierons, 2011; Lindquist, Kaufman-scarborough, & Lindquist, 1999; Mumford & Simonton, 1997; Perlow, 1999; Ruscio & Amabile, 1996; Wright, 1974). From findings in the literature review in the field of Information, Communication and Technology (ICT), similar research about either time pressure or creativity or the relationship between them shows that they have a significant impact on IT-related activities. Interestingly, programming is the area which is most researched (Crawford & Le, 2012; Daniel Graziotin, 2013; Gu & Tong, 2004; Khan et al., 2011; Knobelsdorf & Romeike, 2008; Koh, 2011). Because software is primarily developed by people for people then it is necessary to study human and social factors in each phase of software engineering (Crawford & Le, 2012). A need to study what creativity is in software development from a software engineering perspective has also been identified (Daniel Graziotin, 2013). However, none of these

pieces of research investigate the perceived time pressure with creative cognitive processing of programmers in a large-scale company situation. This research is expected to deliver in-depth quantitative analysis on programmers in government companies in general and programmers in PLN in particular as representative of a large-scale government companies in Indonesia.

This research is expected to provide new perspective in field of information technology in government company with an additional perspective on business complexity, corporate culture and work environment.

1.3.2 Organisational Relevance

From a management point of view, time pressure is a daily work matter which always occurs. Most people have experienced time pressure yet perceived it at various levels. However, not many superior aware the impact of time pressure on both individual and business performance. Moreover, the whole research will demonstrate whether time pressure must exist in the programming phase in terms of producing creative ideas and, at the same time, it is expected to give valuable insight to management on how to treat their programmers properly in order to encourage the best performance for the company. “Research has its special significance in solving various operational and planning problems of business and industry” (Kothari, 2004: 6).

From a company point of view, they can benefit themselves from the results of this research by understanding inefficient activities that may have a significant impact on a company’s performance.

1.4 Outline of the Thesis

Chapter 1 covers the introduction including the problem statement and research aim, research approach and research significance. The literature review about Time Pressure and Creativity and also the hypotheses for the research are given in Chapter 2. Chapter 3 describes methods which make up the research strategy, research operationalisation, data collection strategy process, instrument and statistical analysis. Chapter 4 explains the preliminary study that addresses the concept of time pressure level classification, a specific literature review, the methodology and data analysed and the conclusion of the preliminary study results. Moreover, the data analysis about data validation, validity and reliability test, and the assumption test is presented in Chapter 5. Then, in Chapter 6, research question 1 is discussed including the questionnaire model, the data analysis, the results and discussion, while in Chapter 7 and Chapter 8 research questions 2 and 3 respectively are addressed. Finally, conclusions and recommendations are presented in Chapter 9.

Chapter 2. Literature Review

2.1 Time Pressure

2.1.1 Definition of Time Pressure

Time pressure is cited as a problem experienced by the members of a formal organisation (Andrews & Farris, 1972). Time pressure is also described as a form of tension expressed in the feeling of being hurried (Denton, 1994; Miyazaki, 1993). Another researcher suggested that time pressure as the amount of information that has to process during one time unit or in terms of the time allotted for processing a fixed amount of information (Ben Zur & Breznitz, 1981). Schreuder et al. claimed that time pressure is the sense of having limited time (Schreuder & Coetzee, 2011). Furthermore, time pressure is about acceleration of time orientation that may affect every aspect of a work in an organisation (Rastegary & Landy, 1993).

There are a few references on dimension/element/aspect/component/concept of time pressure. Referring to Kahn et al. (1964), overload is considered to be a concept of time pressure. Literally, overload is defined as an excessive amount. A similar idea is also conveyed by Wright (1974); information load is generally conceived as the amount of data to be processed per unit of time. An employee as an executor has limited cognitive processing capacity. If information overload occurs under acceleration of time orientation, then the sense of time pressure will emerge. Time pressure is considered a response to information input overload (Miller, 1960).

In an organisational context, overload is close to the work overload which is defined as employees' perceptions that the work they have to do is more than their ability to complete it within a given time (Jex, 1998). (French, Caplan, & Van Harrison, 1982) distinguished the type of work overload as: quantitative overload, feelings related to the amount of work, working too fast or too hard, having too much to do, or sensing too much pressure, and qualitative overload, feelings that he/she does not have the time to produce quality work or does not have the skills to perform assignments. In this research, the researcher used only quantitative work overload to measure time pressure as a continuation of qualitative work overload statements that programmers have expressed so far.

2.1.2 Time Pressure Occurence

In the theory of time perception, time portion is determined on the basis of how many events are involved in an interval (Fraisse, 1963; Ornstein, 1969). The more events occurring during a given time, the longer the time portion allocated. Literally, an event means an occurrence happening at a determinable time and place, with or without the participation of human agents (Smirnov, Levashova, & Kashevnik, 2017). Means the content, time, place and person are parts of an event. In the content, there is cognitive input to process all receiving information. Then increasing cognitive

activity should increase the total amount of time that people must take (Block, 1978). When a fixed amount of time is set, increasing cognitive activity may provoke a perception the time is being spent. The time pressure in each individual increases due to the increase in the number of cognitive events taking place (MacGregor, 1993). Logically, the more information processing is accelerated, the more the sense of time pressure perceived.

2.1.3 Effect of Time Pressure

In terms of the impact of time pressure, it is analysed as one of stressors with which a person has to cope through social, cognitive, and biological strategies (Svenson, O. and Maule, 1993). Several pieces of research indicate the aftereffects of time pressure. On an individual level, time pressure will result in: increased performance rates, people focusing on one objective and not considering multiple alternatives; decreased performance quality, people not having a time to deeply understand the information; decreased creative thinking; decreased job satisfaction (Karau & Kelly, 1992; Kelly & Loving, 2004; Linzer et al., 2000). At group level, increasing levels of time pressure impact on team members' focus in a limited range of prominent tasks in both team interaction patterns and team task performance (Kelly & Loving, 2004).

Furthermore, in the context of time pressure occurring in PLN, time pressure is experienced as both an encouraging and a disturbing factor.

2.1.4 Time Pressure Levels

2.1.4.1 Classifying Time Pressure Levels

There is limited literature regarding time pressure levels. Time pressure level were divided into three conditions: High time pressure (HTP), Low Time pressure (LTP) and Undefined Time Pressure (UTP) (Wright, 1974). The details of each condition are as follows: in HTP, under the running time, people who have been informed in advance about their task are asked to finish a task perfectly without sacrificing accuracy as soon as possible, while in LTP, people are asked to finish the task in a period of time and must utilise the entire time, and in UTP, people are asked to finish the task without given delivery time. Literally, it is assumed in the HTP condition that pressure is obviously perceived by people when it occurs at once but includes a number of pressures. Here, Wright (1974) identified three pressures: the time which elapses (time pressure), the task accuracy (skill) and other awaiting tasks (job load). While in the LTP condition, people perceive pressure as low level when the deadline is not close and they are only responsible for their current job. Pressure is only perceived slightly (time pressure) and there is little job load. And in the last condition, UTP, people are only asked to be responsible for their job or, in other words, pressure comes only from very little job load without a deadline.

Andrews et al. categorised time pressure on five levels: Relaxed, Slight Pressure, Moderate Pressure, Great Pressure and Extreme Pressure (Andrews & Farris, 1972). The determination between each level was not mentioned.

Considering classification from Wright (1974) and Andrew and Farris (1972), the levels of time pressure are classified by this researcher as: 1. Relaxed; 2. Slight Pressure; 3. Moderate Pressure; 4. Great Pressure.

2.1.4.2 Definition of Levels of Time Pressure

A single topic of research about time pressure has never been built based on a common theory and body of empirical research (Svenson, O. and Maule, 1993). Mostly time pressure research has focused on the decision-making process and only limited research has been conducted on judgements (Svenson, O. and Maule, 1993) .The researcher couldn't find any theory about definition of time pressure level. In other side, these definition are necessary to clarify and narrow programmers perception of perceived time pressure. Hence, the researcher needs to define the "heaviness" or, in statistical terms, so called operational definition of each level of time pressure, by asking experts, conducting the preliminary study et cetera.

2.2 Creativity

2.2.1 Definition of Creativity

There are various definitions of creativity: creativity is defined as a novel, appropriate response to an open-ended task (T. M. Amabile, 1983); creativity is also described as one possible way to improve the software development process by designing a process which can stimulate the creativity of the programmer (Crawford & Le, 2012); creativity is a process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time (Stein, 2014); creativity is generating something that is both new and truly valuable (Rothenberg, 1990); creativity involves a process that is extended in time and characterised by originality, adaptiveness, and realisation (MacKinnon, 1975). Despite the fact that each author has a distinctive definition of the concept of creativity, all agree that creativity is a process to generate something novel or unusual and the outcome of the process is something useful (Laeonard & Swap, 1999).

2.2.2 The Creative Process

Leonard and Swap (1999) define a series of clearly distinguishable phases that have to be realised by one or more members of the team in order to obtain a concrete creative result because the creative process constitutes the central aspect of team performance.

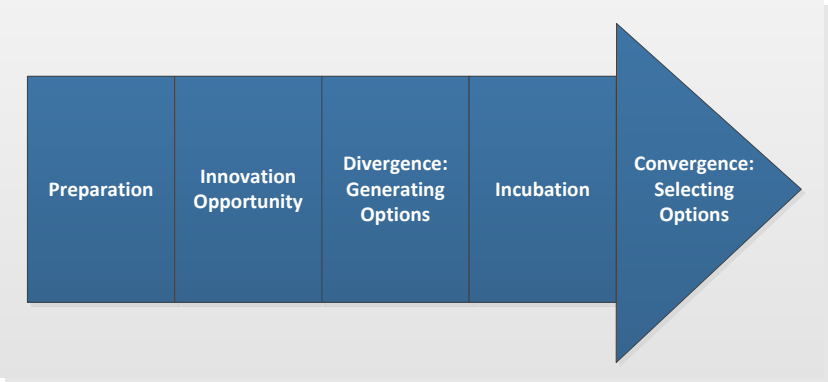


Figure 1. The five steps in the creative process (Leonard and Swap, 1999)

There are five phases to observe in creative processes as described in Figure 1:

1. Initial preparation. In this phase, the problems are encountered. The findings relate to the perception of a problematic situation. Moreover, in this phase also selection of group members takes place to maximise creativity.
2. Innovation opportunity, identifying the problem requiring creativity. It correlates to the understanding and foundation of the problem. The group needs to immerse itself in the problem using knowledge and analytical abilities.
3. Generation of option, promoting divergent thinking or, in other words, the phase to produce a menu of possible alternatives. There are two big aims: finding principles, lines and correlation to any references; generating possible solutions, combinations and interpretations.
4. Incubation, taking time to consider options. The group needs an amount of time to reflect on the elaborated alternatives and to test them.
5. Convergence on one option; this is the final evaluation, moving from many options to one option.

Another concept of the creative process is also illustrated by Amabile with a componential theory of creativity which presents a framework for understanding the effect of time pressure on creativity (T. M. Amabile, 1983). She suggested that time pressure might have an effect in two ways:

1. By directly effecting creative cognitive processing
2. By indirectly affecting it through a motivational mechanism

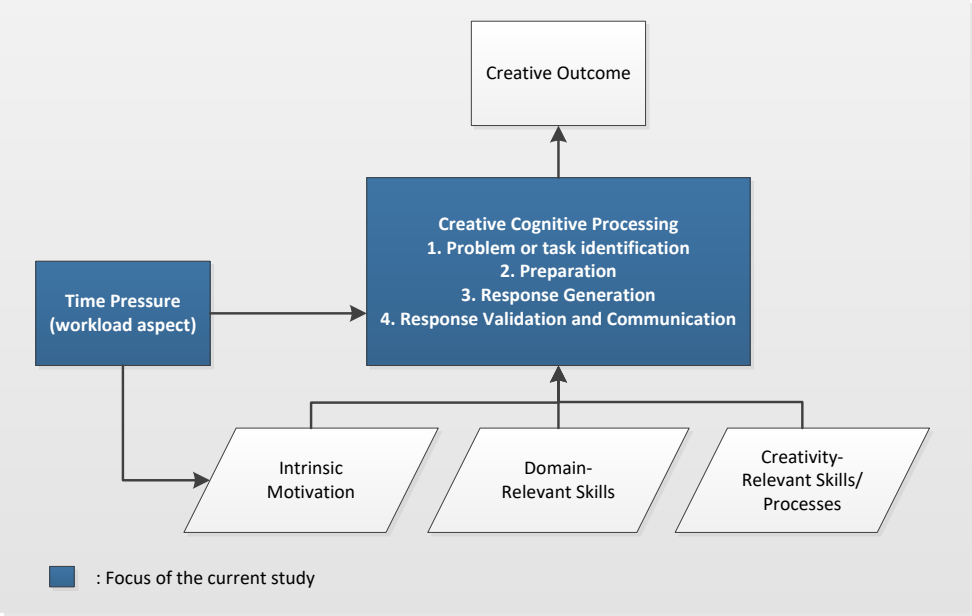


Figure 2. The Componential Theory of Creativity (Ruscio & Amabile, 1996)

Figure 2 illustrates the time pressure effect in two ways: the direct effect is shown by the direct flow relation between blue boxes before the creative outcome; indirect effect is shown by direct flow from the first blue box to the white boxes and a return to the second blue box before the creative outcome.

In the first way, cognitive processing has four basic elements: (1) identification and understanding of the problem or task, sparked by either an external or an internal stimulus; (2) preparation, involving learning and remembering, which helps to build up, reactivate, and/or incubate relevant information for the particular problem at hand; (3) response generation, or coming up with ideas to solve the problem; and (4) response validation and communication, involving articulating, testing, and trying out the most promising response possibilities (Teresa M. Amabile et al., 2002). An individual is involved in these processes, often repeatedly and in different sequences until the problem is clarified.

The second way, through indirectly affecting the motivational mechanism, is by influencing the motivation of people to engage in the task. The theory of intrinsic motivation principle of creativity stipulates constraints in the work environment that may have a negative impact on creativity (Teresa M. Amabile et al., 2002). Time pressure as one example of a constraint found in the work environment may lead people to feel controlled and, in the end, less motivated, frustrated; in short, they may lose interest in their motivation for the task. When people lose their interest, they are less likely to explore each behaviour for creative cognitive processing. And the result is that they are likely to finish the job outwardly, relying on familiar algorithms.

In general, these two theories offer a similar method for producing creativity. Leonard and Swap (1999) said that creativity will arise when the basic mental thinking is deep, rich and well prepared. Deep understanding about the relevant knowledge and experience in the same field precedes creative expression. However, they argued that groups have a potential advantage to create creativity over an individual because multiple sources of knowledge can be tapped only if: there is useful knowledge inside the groups; all the useful knowledge can be accessed; all the accessed knowledge can be shared, processed and synthesised by the group. Since the creative process identified by Leonard and Swap (1999) emphasises creativity in a group or a team, this current study adopts the framework of Amabile et al. (2002) in practice, as a foundation for measuring the creativity of individual programmers.

This researcher highlights creative cognitive processing as a key to addressing the research question. Therefore, creative cognitive processing is then used as variable of the research. While the motivational mechanism, which is believed to have an indirect impact on creative cognitive processing, would not be assessed in order to avoid an overly broad discussion because the researcher assumes there are various work conditions and life background regarded as inspiring and motivating to the programmer for doing such a job.

Furthermore, there is no established technique for studying the outcome of creative cognitive processing in organisations and, thus, Amabile et al. (2002) relied on the basic approach of the consensual technique. Consensual here is defined as the premise that the result of assessment is the most stable and reliable measure of the creativity of individuals if the assessments are conducted by appropriate observers, such as peers or experts familiar with the task domain as long as those assessments show an acceptable level of agreement. However, this research only focuses on two variables: time pressure and creative cognitive processing and the correlation between them without measuring the creativity itself; thus an assessment of creative outcome will not be implemented.

2.2.3 Type of Creativity

There are four types of creativity which correspond to different brain activities: deliberately based; spontaneously based; cognitively based; and emotionally based (Dietrich, 2004).

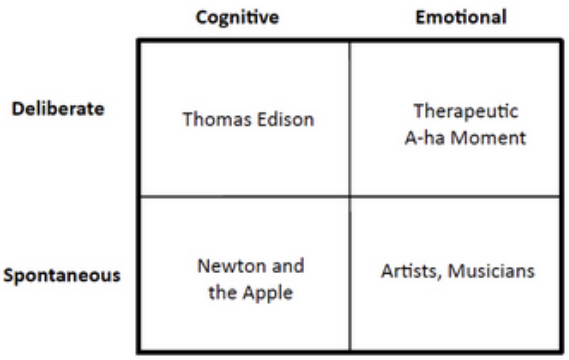


Figure 3. The Matrix of Type of Creativity (Dietrich, 2004)

The details of four quadrants as illustrated in Figure 3 are as follow:

1. Quadrant Thomas Edison, the quadrant that refers to Thomas Edison relates to an inventor or someone who works in a job who needs special skills. These kinds of people act deliberately and cognitively when working in order to create a new idea. The source of deliberate and cognitive activities comes from the pre-frontal cortex (PFC) in the brain. The PFC allows people to do 2 things: focus attention and connect information that they have stored in other parts of the brain. To trigger deliberate, cognitive creativity, people firstly need to have knowledge of one or more particular topics in their brain. Then, once they are being deliberatively and cognitively creative, they are storing those pieces of information in new and novel ways. In summary, the quadrant Thomas Edison requires a high degree of knowledge and needs a lot of time.
2. Quadrant Therapeutic A-ha Moment, the quadrant refers to people who have experienced personal difficulties i.e. got fired, fallen in love, had a promotion or a bankruptcy. In such conditions people tend to have a flash insight about themselves which leads them to take good or bad decisions that contribute to the importance of the moment. There is a deliberate type of creativity (PFC) involved in this activity. Besides engaging in deliberation, they also experience emotional creativity which gives them a-ha moments about feelings and emotions. The part of the brain that processes complex feelings is called the cingulate cortex which relates to how people interact with others, and the environment. The cingulate cortex connects to the PFC. These two brain areas are active in this type of creativity.
3. Quadrant Newton and the apple refers to the story of Newton when thinking about gravity while watching a falling apple. The spontaneous and cognitive creativity involved in this activity comes from the basal ganglia of the brain. This is a place where dopamine is stored, and it is a part of the brain that performs outside of people's conscious awareness. During spontaneous, cognitive creativity, the conscious brain stops solving the problem, and the

unconscious part of the brain will have a chance to work on it. By doing a distinct, irrelevant activity, the PFC is able to connect information in new ways through unconscious mental processing. In summary, spontaneous and cognitive creativity requires a break from work and getting away.

4. Quadrant Artist and Musician refers to the kind of creativity that is used by artists and musicians. The source of spontaneous and emotional creativity comes from the amygdala. The amygdala is a part of the human brain where basic emotions are processed. When the conscious brain and the PFC take a rest, then spontaneous ideas and creations probably take a place. There is no specific knowledge needed for this type of creativity but there is often talent such as in writing, art or music needed to create outcomes from a spontaneous and emotional creative idea. In summary, this type of creativity probably can't be designed for and is more about a gift.

2.3 Hypotheses

Since the purpose of the first and second research questions is mainly to form an exploratory model in a real situation, or so called descriptive research question, no hypothesis is necessarily being tested (McIver & Carmines, 1981). However, the background and the purpose of the analysis will be explained.

2.3.1 Perceived Time Pressure Experienced by the Programmer

Time pressure is related to the concept of overload (Khan et al., 1964). Overload can be interpreted as a conflict between superiors and subordinates. Superiors have authority to have many things done by the subordinates which are mutually compatible to the job descriptions. Nevertheless, it may be impossible to complete all the tasks within the given time limit (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). FM, a senior manager, argued that time pressure is a must for an employee, especially, to encourage and motivate people to reach a certain goal. However, time pressure in PLN is perceived over what could be expected. Despite the role of programmer in software development projects covering as analysts, designers, programmers and testers, as mentioned earlier, programmers are also responsible for changing the information into business process which is beyond their job description.

Referring to the exploratory interview result, regulation and policy in PLN are interpreted by the related division. The Board Director, as a decision maker, evaluates and approves the proposed documents. When the related division doesn't have a fixed Standard Operating Procedure (SOP) or Business Process (BP) to address the changes, this will affect in delay of policy proposed to the Board and at final could delay the project execution. Here programmers are expected to tackle the missing

policy by changing such business processes into programming language even though there is no formal guidance available. It is a dilemma for the STI Division put in effort to achieve the time completion targets. This condition leads to people working overtime, hiring extra people to be involved in a current project and spending extra money. If each division, including the STI, assembles everything well, the undesired condition can be anticipated.

Time Pressure on a specific level increases the performance in an organisation. Pelz and Andrew (1966) indicated that performance tends to be greater for those who worked a nine- or ten-hour day while those who worked a standard eight- or seven-hour day averagely tended to perform at a lower level. Strengthened by Andrews and Farris (1972), who conducted research in a NASA laboratory, it was found that high performing scientists desired more pressure. However, this can be contradiction if the pressure was markedly above that desired, the aspects of performance: innovation and productivity, were low (Andrews and Farris, 1972). One study on 12,000 people who work under pressure found that the notion of people performing best under pressure is a myth (Weisinger & Pawliw-Fry, 2015). Pressure has a big impact: it hinders performance and leadership; influences the emotional brain, cognitive brain, and conversation.

Looking at the situation, management of the STI Division should be aware of the potential problems arise from their employees particularly those related to too much pressure. To provide the information about the perceived time pressure in the workplace, the researcher presents the information on the amount of time pressure for each level in PLN. Hence, even though time pressure is unavoidable, management could apply an appropriate strategy to manage it.

2.3.2 The Maximum Time Pressure for a Programmer

A nine-month study conducted by Perlow in 1999 revealed that a software engineering team perceived “time famine” or, in other words, the perception of having too much to do and not enough time to do it in due to interruptions by other. At PLN, the same thing also occurs to the programmers. The interruptions in PLN are mostly due to responding to new and urgent requests from the management and they result in delayed completion of a programmer’s planned work. The work piles up and it seems like it might never end. The time they spend in the office is possibly much greater than the time they allocate for private and social life. According to JK, deputy manager in the STI Division, the situation is not a prolonged or seasonal condition yet it occurs unpredictably. MR, the senior programmer in the STI Division, stated that this situation dominates their daily working lives. This is a mismatch where every person has a different opinion. It is essential for the management to have an active role in controlling work progress, facilitating and supporting their employees to do their jobs effectively and to contribute to the success of the division. Research question two aims to provide information on the maximum acceptable pressure specifically pressure

caused by time restrictions that is acceptble by the programmer. The result is expected to distinguish between positive pressure which may improve programmer's contribution, and negative pressure which may be detrimental to a programmer's capability.

2.3.3 The Relationship between Time Pressure and Creativity of Programmer

In most discussions, the influence of time pressure has several effects on human beings in terms of performance, confidence, behaviour, and they are considered negative even though a few scholars have proved a positive relationship (Andrews & Farris, 1972; Hall & Lawler, 1971; Pelz & Andrews, 1966). Negative results came from Amabile in 2002 who examined the relationship between time pressure and creativity amongst 177 corporate employees. By assuming time pressure as a carrier of change and referring to such literature, researcher asserts the idea that time pressure is associated to negative effect on creativity.

Various opinions were gathered by formal data collection through exploratory interview. Some people argued that time pressure is perceived as something that limits them to thinking creatively. For example, FR, a senior programmer in STI Division, said that when time is limited, he tends to avoid creative thinking. A similar opinion was also expressed by LK, a senior programmer in STI Division; she said when there is a time restriction, she would be rushed to finish the documentation or commentary in the listing program and, in the end, this leads to many hesitations. Some people think time pressure impacts both positively and negatively on their work life. AAS, a junior programmer in STI Division, stated the positive effect of having time pressure is that she tends to be focused on only completing one task without disruption from other tasks. However, she has to do multiple tasks at once which results in unfinished tasks. Moreover, the negative effect of time pressure emerges as a feeling of being rushed, which influences her way of thinking. Although some opinions suggested a positive relationship, but most of the arguments declared time pressure to have a negative effect on creativity.

Regarding the componential theory of creativity, the creative process consists of several sub-processes which occur in any sequence and will often recur iteratively until a creative outcome has been attained (Teresa M. Amabile et al., 2002). Whereas other research has observed that cognitive control to be deteriorated when complex tasks were performed under time pressure (Rothstein, 1986). Since cognitive function also underlies the creative process, when the control system in such processes or so called creative cognitive processing is disturbed by time pressure, logically the creative outcomes are also being hampered.

Here, researcher would like to propose a hypothesis as:

H1: High time pressure will lead to negative effects on a programmer's creative cognitive processing.

What level of time pressure exactly could induce creativity? It might be supposed that the level of time pressure has a more positive effect on creativity. If time pressure is lower than this slight level, it means that the employee will have nothing to motivate him or her. This is contradictory to what FM, a senior manager, stated: that time pressure is a must for employees in PLN. This statement will also considerred to establish the next hypothesis:

H2: Slight pressure is the best time pressure level for a programmer in order to generate creativity.

Chapter 3. Methods

Chapter three outlines the methodology used in this research. Firstly the research strategy is explained in more detail. After the research strategy, the research operationalisation is discussed followed by the data collection strategy. Later, the instrument is described in the last part of this chapter.

3.1 Research Strategy

The strategy of this research is a deductive case study to confirm or reject a set of hypotheses. Contemplating the basic ideas of previous research, this research would be carried out by a quantitative approach analysis in PLN Holding and its subsidiary as a large-scale government company in Indonesia. Referring to research design as the process of making decision before the situation arises for which the decisions have to be carried out (Ackoff, 1953), this research follows the research design as described in Figure 4.

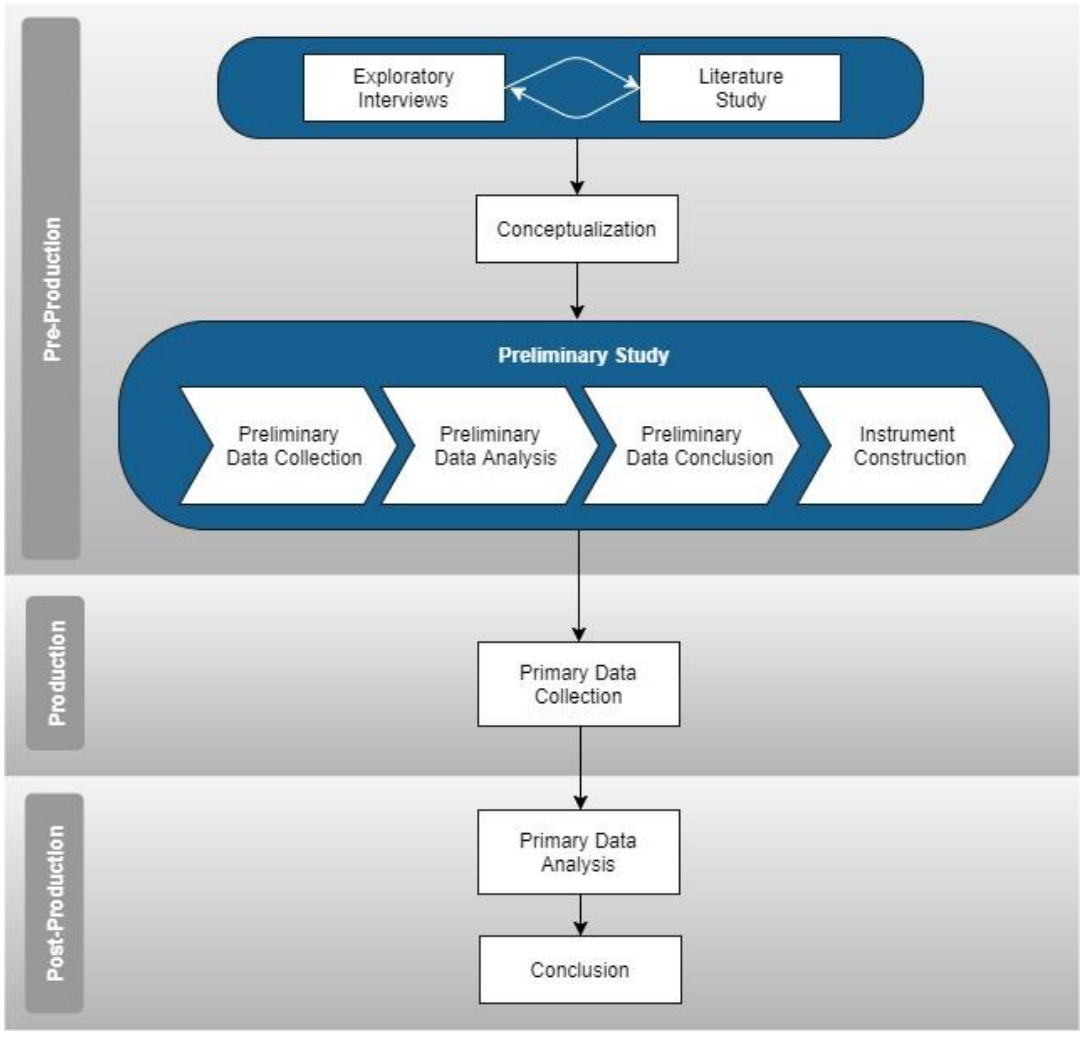


Figure 4. The research design

The research design consists of three activities: pre-production, production and post-production. The pre-production phase is the initial phase where researcher recognises the research problem and may be continued by the preliminary study. Production phase is when the researcher performs the data collection and the post-production phase contains the study where the analysis and conclusion.

3.1.1 Pre-production

3.1.1.1 Exploratory Interview

The background to this research topic was unearthed due to a discussion with the researcher's colleague, FR, who is a programmer. The discussion was mainly about how life was going being a programmer. The conversation went normally with some normative statements about the company's code of conduct. Interestingly, he argued that time is always an issue for his job. In that sense, the researcher investigated a related topic by interviewing the other four programmers to get more opinions and information. The judgements were more less the same as FR's opinion that time is the main issue. Some colleagues argued that time somehow creates a good feeling for them. However, LR, an assistant analyst, was impressed by an incident that occurred in the office that was precisely due to time. In order to achieve a balanced perspective and to control subjective bias, the researcher also conducted interview from PLN's management. Interviews were held in the STI Division in PLN's Head office with a related senior manager and a deputy manager. The obtained information was then redefined and reformulated to confirm the criteria for a good problem (Rajasekar, Philominathan, & Chinnathambi, 2006). It was then translated into a problem statement consisting of three research questions.

Sugiyono (2017) classified research question in quantitative research into: descriptive research questions which focus only on one variable and one group aiming to describe and quantify the variable to be measured; and relationship-based questions which can be treated simply as a useful way of describing the fact of the relationship between two variables or more. The first and the second research questions in this research are descriptive research questions while the third is relationship-based research question. The researcher included the first two questions into descriptive research question because those questions focus on a particular dependent variable, Time Pressure, in one group. Moreover, the objective of the first question is to describe each level of time pressure that is experienced by the programmer in PLN while the second question is to describe the maximum limit of the programmer's capability in handling the task. Next, the researcher put the third research question into a relationship-based question since the objective is to discover the correlation between Time Pressure as a dependent variable and Creativity of programmers as an independent variable, and whether the curvilinear relationship is also applied (Teresa M. Amabile et al., 2002).

3.1.1.2 Literature Study

After problem is identified and determined, the researcher reviewed and studied the defined problem by literature survey. This stage was imperative to ensure whether the defined problem has been studied in the previous research and to understand the technique used to investigate the similar problem and also other information that the researcher needed to solve the issue (Rajasekar et al., 2006). The literature study ended with formulating the hypotheses.

3.1.1.3 Conceptualisation

Selecting the research methodology was done at this stage. Also the variables were operationalised, the sample determined, and the practical method for the research chosen. In order to satisfy the thesis objective, quantitative research was carried out.

According to the theory explained by Kothari in 2004, research methods are all the methods/techniques used to execute research, and classified as: 1. collection of the data; 2. statistical techniques; 3. methods to evaluate the accuracy of obtained results. In this research, the researcher used the research methods as follow:

3.1.1.3.1 The data collection

The series of data were collected in PLN and its subsidiary with the programmers as the respondents. The detail about the data collection strategy can be found in Section 3.3.

3.1.1.3.2 The instrument

In this research, a questionnaire was used as the instrument to quantify the variables. The questionnaire was divided into four parts and designed to answer all three research questions. Further detail about the instrument for research can be seen in Section 3.4.

3.1.1.3.3 The Statistical Method

3.1.1.3.3.1. Statistical Method for Research Question One

Research question one is ***How much time pressure is experienced by the programmer in government company?*** Researcher investigated the mid amount of each level of time pressure perceived by the programmers. The single variable used was time pressure. The respondents answered the questionnaire by filling in the amount of pressure, as a percentage, that they experienced at each level of pressure: relaxed; slight pressure; moderate pressure; and great pressure.

The statistical median approach was used to measure central tendency in this analysis instead of the average (mean) wich is traditionally a popular measure of a mid-point sample. In some cases it has the drawback of being affected by any single value being too high or too

low compared to the rest of the sample. Thus, the researcher considerred median as a better measure of mid-point than that of mean.

In general, result of RQ1 is presented as the median value of each perceived time pressure level.

3.1.1.3.3.2. Statistical Method for Research Question Two

Research question two is ***What level of time pressure do programmers consider maximum?*** Researcher explored at what level of time pressure the programmer perceived as the maximum they could accept to keep the result excellent. In the questionnaire, the respondents were given four pressure level situations. Each situation represents one pressure level. The pressure level was defined based on the preliminary data result as: relaxed; slight pressure; moderate pressure; and great pressure. Here, they were asked whether, in such a situation, they could still complete the job excellently. The respondents answered by selecting from only two given options: Yes, I can or No, I can't which was attributed to the corresponding pressure level mentioned in the question.

The maximum time pressure level perceived by programmer is obtained by the responses of "Yes, I can" on the highest pressure level among these four pressure level situations, responses on the lower pressure level situation will not be accounted. The results from each programmer were grouped with others whose results also fell into the same level of time pressure.

Finally, results analysis of RQ2 are presented in percent of number of programmer in each group.

3.1.1.3.3.3. Statistical Method for Research Question Three

Research question three is ***What is the relationship between time pressure and programmer's creativity?*** Researcher correlated the perceived time pressure with programmer's creativity based on the instrument's result. Variables in the questionnaire were treated as independent (time pressure) and dependent (creativity). Respondents had to acquire a minimum of 1 year of working experience in the same job description as a control criterion. Researcher assumed that people would understand the real situation of their workplace including the workload, pressure and rhythm with a minimum of 1 year in the same company. And could objectively measure the "heaviness" of being a programmer in such a company. The respondents were given a questionnaire consisted of 23 questions on two subjects: time pressure and creativity.

A Pearson Product-Moment Correlation was applied to analyse these variables. Pearson quantifies the strength as well as the direction of such a relationship to answer research

question three. This parametric statistical method was carried out after the assumption tests were confirmed. Researcher performed a normality test to determine the validity of the assumption of the parametric procedure.

Results analysis of RQ3 in the Pearson correlation demonstrated the amount and the significance of the responses. This result was then compared to the theory from stipulated scholarly literature in order to accept or reject the hypotheses.

3.1.1.4 Preliminary Study

The researcher needed to identify the real time pressure conditions of PLN especially in the STI Division. For this reason, the researcher created her own method for obtaining such information by interviewing four PLN programmers about topics related to section 2.1.2 as a basis for work overload as follows:

1. The task events per day experienced by programmers in their daily work life
2. Time allocation
3. The frequency of acceleration per day in processing information. Frequency of acceleration refers to the amount of instructions accepted by a programmer to speed up the event. Instruction may come from superiors or management in PLN. The acceleration, when linked to a fixed delivery time leads to pressure, and forward mentions as a pressure.

The practicality and detail of the interviews are explained in Chapter 4 as a part of the preliminary study.

However, identifying existing time pressures in PLN is not enough to answer the research questions. Since perceived time pressure is a subjective matter, every programmer may have a different perception, and perceived time pressure degree must be addressed and grouped into several determined levels. This classification is intended to make time pressure more measurable.

This research adopts and elaborates the time pressure levels from several pieces of literature: (Wright, 1974); (Andrews & Farris, 1972); (Zakay, 1993). However, there are no literatures clearly described the operational definition of each time pressure level. Researcher then tried to consult with the expert but unfortunately, there was no response. Thus, the researcher conducted a survey for another preliminary study with 66 programmers from various companies including PLN. This preliminary survey was also subjected to external validation for the main questionnaire.

The results of the preliminary study were then used as a reference to compose the initial questionnaire.

3.1.2 Production

3.1.2.1 Primary Data Collection

There are two steps in obtaining the primary data: survey with an initial questionnaire and survey with validated and reliable questionnaire. The initial questionnaire was distributed to 46 programmers in similar government companies in Indonesia to test validity and reliability of the instrument. Confirmation of the validity and reliability of instruments is prerequisite to guaranteeing the integrity of study findings (DeVon et al., n.d.). The validated and reliable questionnaire was then distributed to 90 programmers in PLN and its subsidiary. The details on data collection can be found in Section 3.3.

3.1.3 Post-production

3.1.3.1 Primary Data Analysis

All techniques adopted to analyse the data are comprehensively explained in Section 3.1.3. The researcher utilised the IBM SPSS version 20 software to advance the analytics. Additionally, Excel was also used for simple analysis, for example, to find the maximum value in the data set.

3.1.3.2 Conclusion

In conclusion part contains the research summary and the highlights of the research. Recommendations are also addressed with a view to future work such as on challenges for the programmers, management and scholars.

3.2 Research Operationalisation

In operationalisation contex, a concept is defined as formally and logically developed ideas about classes of phenomena that a researcher seeks to study; a variable is defined as the ideas that have been logically constructed to establish internal differences that can be observed and measured, the empirical counterparts of concepts; and an indicator is defined as observable phenomena that can be used to designate and distinguish measured differences within variables (Nevarez, 2009).

In practice, these three are often interchangeable. One of the differences is the level of abstraction. A concept may have multiple dimensions, and a dimension may have multiple indicators (Raymo, 2009). At this level, a concept is practically equivalent to a variable.

“We are usually more interested in dimensions than in concepts which are more abstract and vague. And when a dimension is not directly observable, we use indicators” (Raymo, 2009: 4).

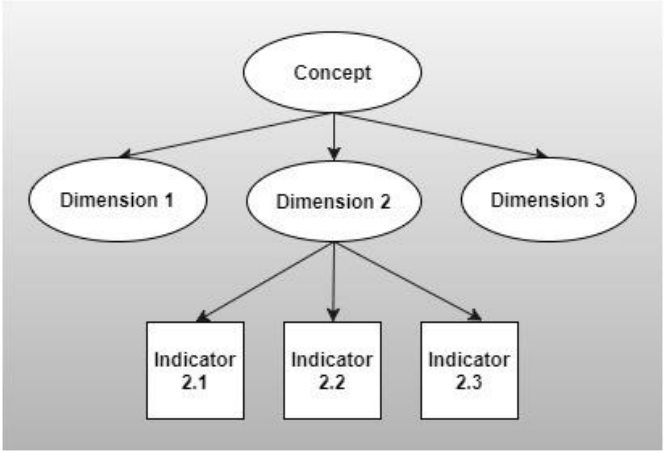


Figure 5. The level of abstraction for Concept, Dimension and Indicator (Raymo, 2009)

Accepting the defined term and following the level of abstraction above, a researcher operationalises the statistical terms used in this research as depicted in the figure below.

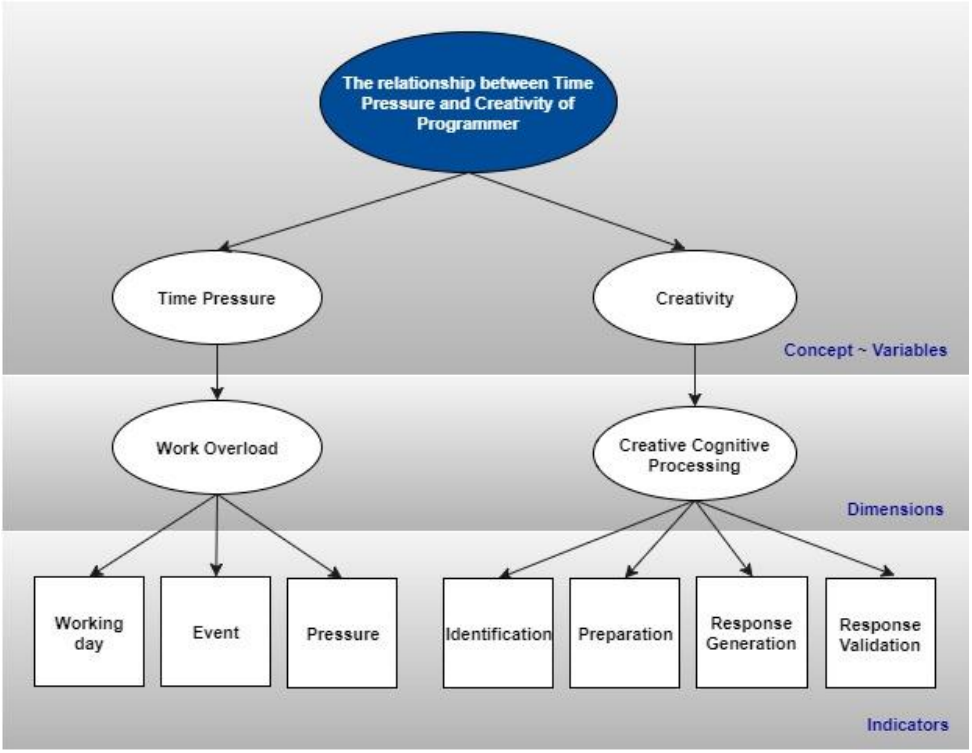


Figure 6. The level of abstraction

Figure 6 highlights time pressure as an independent variable, which is naturally manipulated, and creativity as a dependent variable which is affected by the independent variable.

Table 1 shows the delineation of the level of abstraction above and gives a thorough explanation of each variable/dimension/indicator definition.

Table 1. Variables of perceived time pressure and creativity

Name of Variables	Dimensions	Indicators/Elements	Type of Measurement	Definitions
Independent Variable				
Time Pressure				
	Work overload			Degree of time pressure which is experienced by the programmer (Andrews & Farris, 1972; Wright, 1974; Zakay, 1993).
		Number of working days in a week	Interval (part 1 in Questionnaire) Nominal (part 2 in Questionnaire) Ordinal (parts 3&4 in questionnaire)	Synthesised from preliminary study's result, it can be defined as the number of working day that programmer spend to do the job in a week.
		Number of events in a day		Synthesised from preliminary study's result, it can be defined as the number of event that programmer are involved in one working day in average.
		Amount of pressure in a day		Synthesised from preliminary study's result, it can be defined as the number of pressure coming from both vertical and horizontal relationship that programmer accepts in one working day in average.
Dependent Variable				
Creativity				
	Creative Cognitive processing			*Set of various cognitive processes that most immediately determines the creativity of work outcomes* (Amabile et al., 2002).
		Identification and understanding of the problem or task	Ordinal	Activities where people take the time to understand the problem deeply (Amabile et al., 2002).
		Preparation, involving learning and remembering	Ordinal	Activities where people take time to fully prepare to solve the problem through learning and contemplation of what they have learned (Amabile et al., 2002).
		Response generation or coming up with the ideas	Ordinal	Activities where people take time to explore for generating new ideas (Amabile et al., 2002).
		Response validation and communication	Ordinal	Activities where people take time to fully think through or talk through the implications of the response possibilities they have generated (Amabile et al., 2002).

3.3 Data Collection Strategy

3.3.1 Participants

The criteria of respondents were set depending on factors that would make the research questions be answered appropriately. The criteria of respondents in this research are:

1. Respondent is a programmer
2. S/he is a permanent employee of PT PLN (Persero) within different levels of positions stationed in different branch offices of the company across the province in Indonesia or PT Indonesia Comnets plus (Icon) as a PLN subsidiary
3. S/he has a minimum of one year working experience in a programming job or project management
4. The minimum education is higher vocational education

3.3.2 Sampling Strategy

Considering the limited number of respondents to fit the required criteria, researcher determined the purposive sampling as the sampling strategy (also known as judgement, selective, or subjective sampling) technique. The purposive sampling technique deliberately select particular respondents due to the unique characteristic of respondents (Tongco, 2007).

3.3.3 Sample Size

Tangco (2007) suggested a non-random sampling technique doesn't need underlying theories or a set number of respondents to gather the data. Around 90 potential respondents who suit the requirements were selected to participate in the survey. Unlike random sampling, non-probability methods like purposive sampling are not free from bias because the respondents may be chosen out of convenience or from the recommendations of knowledgeable people. However, data collection for purposive sampling may be categorised as valid for certain studies. In this research, when a sample is measured correctly, the sample becomes valid hence providing internal validity.

3.3.4 Response Rate

Response rate is the number of respondents presented as a percentage of those who complete a questionnaire or interview (Nevarez, 2009). In addition, although the factors which constitute an acceptable response rate are not fully agreed upon among scholars, most considered anything below 50% to be poor and anything over 90% to be excellent. Yet, a research carried out by Baruch and Holtom in 2008 disclosed that the average response rate for studies that utilised data collected from organisations was 35.7%. It is obvious that research conducted at the organisational level by seeking responses from organisational representatives or top management are likely to experience lower response rates with an average benchmark of approximately around 35-40%. Since this research was conducted in an organisation, hence the response rate suggested by Baruch and Holtom in 2008 is applied (Baruch & Holtom, 2008).

3.4 Instrument

As stated before, the instrument used to quantify the variables was a questionnaire. The researcher designed a questionnaire containing four parts to answer three research questions. The number of instruments in a study is dependent on the number of variables used, for instance if the number of variables is five then the instruments will be five. In this research, research questions numbers one, two and three used one, one and two variables respectively. Hence the researcher created four parts to the questionnaire following the number of variables. Here, the number of instruments was presented as the integrated number of parts since the data was gathered at one point in time (Sugiyono, 2010). Furthermore, to strengthen the instrument for research question three, the

researcher modified the questionnaire related to this part. Thus, the researcher conducted two primary surveys in total by different questionnaires of which the first was to answer research questions one and two; and the second was to answer research question three.

In addition, the first research question was based on a question in research conducted by Andrew and Farris (1972), while research questions two and three were designed by the researcher.

3.4.1 Questionnaire

A questionnaire is defined as a measurement instrument that provides written instructions and questions which respondents self-administer in order to provide data for analysis (Nevarez, 2009).

3.4.1.1 Outline Questionnaire

The outline of the first questionnaire contains: 1. introduction; 2. filtering questions; 3. perceived time pressure experience questions; and 4. maximum time pressure questions. The introduction summarised the research objective, the questionnaire instructions, the time investments, and the privacy statements. The outline of the second questionnaire was more or less similar to the first questionnaire. Points 1 and 2 are the same; however, points 3 and 4 respectively contained time pressure level questions and creativity questions. All the questionnaires were distributed in Bahasa Indonesia due to the fact that the respondents were all Indonesians.

The objective of the questionnaire was mentioned early to embed a clear perception concerning the purpose of the research.

Both the first and second questionnaires contained five information in the introduction:

1. The total number of questions
2. Instructions for answering each question
3. There is no correct or wrong answer
4. The answers are expected to be delivered based on a respondent's perception
5. As this research is conducted at PLN and Icon, any confidential data extracted from the company will not be available for further disclosure beyond the interest of this research

To avoid unbiased answers, the surveys were conducted anonymously. For ethical issues, any representation of secondary data will be acknowledged with a corresponding reference.

In the filtering questions, there were two questions provided to fulfil the criteria of targeted respondents. The first asked about the professional background; the second is about the minimum working experience.

Furthermore, the total number of questions differed per part depending on the objective.

3.4.1.2 Scales

The overview of the scaling model is described in the following table.

Table 2. Scale overview of the questionnaire

Parts	Objectives	Variables	Scales	Example of an item	Number of items
1	To measure perceived time pressure	Time Pressure	(Andrews & Farris, 1972)	Technical Jobs sometimes involve working under time pressures exerted by other people – results are needed urgently, there are deadlines to be met etc. According to your working experience as a programmer, in a typical day about what percentage of your time is spent under the following or similar conditions of pressure during working? (Andrews & Farris, 1972) Condition: 1. I feel relaxed all the time or I only need to do my routine task every day 2. I need to finish my routine efficiently since the deadline is tomorrow. My Supervisor always asks about progress. 3. While I'm doing my routine that is due today, I have another subsequent task waiting to be done shortly and the report needs to be finished on the same day. 4. I feel there is not time to finish several pending tasks that should be submitted shortly while I'm still preparing for a presentation for today meeting.	1
2	To measure maximum time pressure	Time Pressure	Researcher's design	Do you think you can finish all tasks excellently when you're asked by your superior to do a routine task without time limit?	4
3	To correlate perceived time pressure and creativity	Time pressure	Researcher's design	I'm asked to fix a bug in a program that just launched last month and submitting the result whenever I finish.	11
3	To correlate perceived time pressure and creativity	Creativity	Researcher's design	It is hard for me to rapidly trace the source codes which makes my program fail to run.	12

A Likert 4-Point Scale Response was applied in this research. For research conducted in Indonesia, it is suggested to use even Likert scales, i.e. a 4-point Likert scale: 1 (strongly agree); 2 (agree); 3 (disagree); 4 (strongly disagree) (Pujihastuti, 2010). An even scale is used because individuals in Indonesia tend to be neutral. If research uses an odd scale i.e. a 5-point Likert scales: 1 (strongly agree); 2 (agree); 3 (neutral); 4 (disagree); and 5 (strongly disagree), there are worries that respondents tend to choose three (mid-point) which reflects a neutral attitude. Armstrong conducted two surveys: 1. Instrument with "undecided" as a middle point of the Likert scale and 2 (Armstrong, 1987). Instrument with "neutral" as the middle point amongst two different respondents group and concluded that “Analysis showed differences were negligible and little if any erosion of score appears to result”. Preliminary study by Garland found evidences about social

desirability bias, arised from respondents' desires to please the interviewer or to be appeared helpful or not to be seen to any socially unacceptable answers, can be minimised by eliminating the mid-point ('neither... nor', uncertain etc.) level from Likert scales (Garland, 1991). Research carried out by Wakita et al. was composed of 3 types of questionnaires with the same items but using different numbers of options to assess these items (specifically: 4-, 5-, and 7-point scales) (Wakita, Ueshima, & Noguchi, 2012). The results indicated that the number of options influenced the psychological distance between options, particularly for the 7-point scale. This influence was revealed only by the authors' algorithm; descriptive statistics and coefficients of reliability did not show that the number of options had a prominent influence.

To sum up, from those 4 references, particularly by the result of Pujihastuti (2010), researcher was confident employ a 4-point Likert scale in the questionnaire especially to respondents of Indonesian.

3.5 Statistical Analysis

3.5.1 Data Validation

From the perspective of verification and disregarding correction activities, "data validation is defined as an activity verifying whether or not a combination of values is a member of a set of acceptable combinations" (Zio, Fursova, Gelsema, & Gießing, 2016: 5). The objective of data validation is to ensure the quality of the final data. However, quality has broad dimensions in statistical terms: relevance, accuracy, timelines and punctuality, accessibility and clarity, comparability, coherence and completeness (Zio et al., 2016). Thus, only dimensions which are concerned to the research objective should be established. According to Hair Jr et al., the main issues are missing data, data distribution and suspicious response pattern i.e. straight lining, inconsistent and extreme answer (Hair Jr, Hult, Ringle, & Sarstedt, 2016). These three terms are believed to satisfy the dimension of quality as set out by Zio et al., and a researcher should examine them as part of data validation. Furthermore, in scientific references, data distribution is utilised as a parameter in normality test. If the data is normally distributed, then parametrical statistical analysis could be used.

The details of data distribution in terms of normality tests are explained in a separate sub-chapter due to alignment with other statistical tests, while missing data and suspicious response pattern are presented below.

3.5.1.1 Missing Data

Missing data may occur when respondents fail to answer one or more questions. Since the questionnaire was administered as an online survey by using a free Google form, missing data are anticipated by activating required/mandatory question option for all important questions.

3.5.1.2 Suspicious Response Rate

When a respondent tends to give similar responses for the majority of queries, linearisation would be considered to be the simplest data fitting for a suspicious data pattern. For example, if a respondent answers the questions with all 1s or 4s in the Likert scale, then these respondents type in most cases should be removed from the data set. Moreover, another model for suspicious data pattern is outliers, defined as extreme spikes of difference in answers within the dataset (Hair Jr et al., 2016).

3.5.1.3 Outliers Screening

Any extreme responses to exclusive or even all queries are outliers, for which the corresponding data deviate away from the rest of the research data (Hair Jr et al., 2016). Statistics analysis software such as IBM SPSS feature outlier detection. Software traces whether there are outlier tendencies in the dataset and confirms if these outliers affect the data. These outliers require particular treatment due to the possibility of interference with the data analysis result.

IBM SPSS uses the interquartile range (IQR) to identify outliers for a single, continuous field. A value is considered if it fulfils one of the conditions below:

1. $<25^{th}$ percentile – 1.5*IQR
2. $>75^{th}$ percentile + 1.5*IQR

In detail, an outlier is outside the range [Q1 - 1.5*(Q3 - Q1), Q3 + 1.5*(Q3 - Q1)], where Q1 is the first quartile (25th percentile), and Q3 is the third quartile (75th percentile) (IBM, n.d.-b).

IBM SPSS marks outliers for “out” values as a small circle and “far out” or extreme values as a star. In this research, outliers marked as a star would be identified as true outliers. Research conducted by Hoaglin and Iglewicz in 1987 demonstrated that a 1.5 multiplier was inaccurate approximately 50% of the time, they suggested 2.2 is probably more valid in mostly applied cases. Since IBM SPSS by default is set to a 1.5 multiplier and it can’t be adjusted, thus researcher only considered the extreme values to be removed. An insignificant number of outliers can simply be removed from the dataset; however, any significant number of outliers may correspond to distinct or unique subgroups of a sample (Hair Jr et al., 2016).

3.5.2 Validity and Reliability

A good data collection instrument (questionnaire) is required to achieve high confidence accuracy results. The quality of the data collection tool (questionnaire) depends on 2 main criteria: validity and reliability.

Validity is defined as the extent to which a concept is accurately measured in quantitative research (Heale & Twycross, 2015), whereas reliability is defined as the extent to which a research instrument

consistently displays the same results in the same circumstances with any repetitions (Heale & Twycross, 2015).

3.5.2.1 Validity

3.5.2.1.1. Content Validity

Content validity describes the extent to which a research instrument accurately measures all aspects of a construct or, in other words, it measures what it is supposed to measure. To verify content validity, the content of the instrument should be compared to the theory of the related subject and then followed up by asking for a judgment from the expert (Sugiyono, 2010).

3.5.2.1.2 Construct Validity

Construct validity is described as the extent to which a research instrument measures the intended construct. To verify construct validity, each item in the questionnaire should be tested by examining the factor analysis (Sugiyono, 2010). The score from each item of a factor is correlated with the total score from all items. The result is called a correlation coefficient (r *value*). To prove whether the r *value* is valid, then the r *value* is compared with the critical values in the table (r *table*) (see Appendix A: Table of critical values for Pearson's r). If the r *value* > r *table*, the construct is valid and vice versa. The formula of Pearson's Product Moment Correlation can be used to correlate each item score and total score (Riduwan, 2009):

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N})}}$$

where:

r = Correlation Coefficient,

∑x = total item score,

∑y = total of all items scores,

N = number of respondents,

In this research, a construct validity test was performed using IBM SPSS version 20. The minimum number of samples is 30 for a population (Sugiyono, 2010).

3.5.2.2 Reliability

Reliability refers to the consistency of a measure. For internal consistency, Cronbach's alpha is the acknowledged parameter for examining reliability in social sciences. The minimum acceptable threshold for Cronbach's alpha is 0.7 as suggested by Nunnally (Nunnally & Bernstein, 1994). And if

the construct has a Cronbach's alpha lower than 0.7, the item may not be measuring the same underlying construct or the questionnaire doesn't have enough questions for the construct (Flynn, Kakibara, Schroeder, Bates, & Flynn, 1990).

The formula for measuring the alpha coefficient:

$$\text{Alpha} = [\text{n}/(\text{n} - 1)] \times [(Var_t - \Sigma Var_i)/Var_t]$$

where:

Alpha = estimated reliability of the full-length test

n = number of items

Var_t = variance for the whole test (standard deviation squared)

ΣVar_i = sum of the variance for all n items

Considering there were Yes No questions or so called dichotomous questions, especially in part two of the questionnaire, the researcher used -. The KR-20 is a special case of Cronbach's Alpha in which the items are binary variables (commonly scored as 1 or 0) (IBM, n.d.). KR-20 is mainly used for dichotomous scored items with a range of difficulty.

The formula for KR-20:

$$KR20 = [n/(n - 1)] \times [1 - (\Sigma pq)/Var]$$

where:

KR20 = estimated reliability of the full-length test

n = number of items

Var = variance for the whole test (standard deviation squared)

Σpq = sum the product of pq for all n items

p = number of people in the sample who answer the question correctly

q = number of people in the sample who didn't answer the question correctly (or 1 - p).

To ensure whether the instrument is reliable, parts one, three and four of the initial survey were examined using IBM SPSS version 20 to calculate the Cronbach's alpha values for each item, while part two was examined using Microsoft Excel 2016 to calculate the KR-20.

3.5.3 Assumption Test

The proper statistics analysis method for the research is dependent on the characteristics of the population in the data set or commonly called statistic parametric analysis (Azwar, 2001). A parametric approach is based on various assumptions and different scholars may have different opinions. Hinkle et al. suggested four assumptions as a basis for parametric statistics (Hinkle, Wiersma, & Jurs, 1998):

1. Samples are taken randomly from each population,
2. The dependent variable is a ratio or interval data type,
3. The populations are normally distributed,
4. Variance of sample groups is equal or homogeneous.

While Minium and Clarke mentioned two assumptions (Minium & Clarke, 1982):

1. Each population is normally distributed,
2. Variance of the compared groups is equal or homogeneous.

And three assumptions are described by Hadi (Hadi, 1994):

1. Samples are taken randomly from the populations,
2. The score distribution for the dependent variable is normal,
3. Variance of the compared groups is homogeneous.

From all the suggested assumptions, a normality assumption and homogeneous assumption consistently exist while the rest of the assumptions do not. Those are not consistenly exist may be attributed to data retrieval technique (Kerlinger & Pedhazur, 1973). A random sampling assumption is about how the samples are taken while the data type for a dependent variable can be found in the operational definition.

Zhang suggested that homogeneity of variance is a major assumption underlying the validity of many parametric tests such as a t-test and ANOVA, because those two tests depend on the extent to which the data conforms to the assumption of homogeneity of variance (Zhang, 1998). Since the main objective of the statistical analysis of RQ3 was to examine the relationship between dependent variables and independent variables and not analyse the variance of the dataset, then the homogeneity test was eliminated from the applied test.

3.5.2.1 Normality Test

The type of dataset whether normally distributed or not would lead to a statistics analysis method. In accordance with data distribution, skewness and kurtosis may be applied to examine the tendency of distribution. Skewness is described as the extent to which a variable's distribution is symmetrical, while kurtosis is defined as a measure of whether the distribution is too peaked (Hair Jr et al., 2016). Skewness is a measure of the asymmetry of probability distribution of a random variable about its mean which can be positive or negative or undefined. Kurtosis is a measure of tailedness of the probability distribution of a random variable. Kurtosis of any univariate normal distribution is 3. Distribution with kurtosis less than 3 refers to fewer and less outliers than for the normal distribution and is called platykurtic. Distribution with kurtosis greater than 3 refers to more outliers than for the normal distribution and is called leptokurtic.

When both skewness and kurtosis are close to zero, the pattern of responses is considered a normal distribution. Otherwise, if the number of both skewness and kurtosis are greater than +1 or lower than -1, the distribution is considered non-normal (Hair Jr et al., 2016). Further, a normality test shall be verified prior to specifying the data analysis method in a quantitative research environment. In this research, the assessment of normality was performed using a Kolmogorov-Smirnov test.

Moreover, to carry out the normality test, the researcher proposes the statistical hypotheses as follow:

H0 : Data distribution does not deviate from Gaussian distribution

H1 : Data distribution deviates from Gaussian distribution

A normality test cannot prove whether the data is a sample of a normal distribution or not, yet a normality test is more to show how far the examined data distribution deviates from the ideal normal distribution (Widhiarso, 2012). The ideal or standard normal distribution is commonly called the Gaussian distribution.

A K-S test compares the theoretical cumulative distribution frequency (D *table*) to the empirical cumulative distribution frequency (D *empirical*). Cumulative frequency is defined as the accumulation of the corresponding frequency to the ascending or descending data arrangement.

There are two rules for accepting/rejecting the statistical hypotheses:

1. If D *empirical* < D *table*, then the data is normal or does not deviate from the Gaussian Distribution, and vice versa.
2. If Z value < 1.96, then it is significant at P < 0.05 (Widhiarso, 2012). In small samples, values greater or lesser than 1.96 are sufficient to establish normality of the data. But, in large samples (200 or more) with small standard errors, this criterion should be changed to ± 2.58 (Ghasemi & Zahediasl, 2012).

The theoretical cumulative distribution frequency can be seen in Appendix B (D *Table* or the critical value of K-S table).

Chapter 4. Preliminary Study

Preliminary study was carried out establish the base knowledge to design the main questionnaire. Looking at the research topic, time pressure is a subjective matter every respondent perceived differently. Degrees of perceived time pressure had to be clearly defined and grouped into certain levels to avoid bias in the time pressure condition and unexpected responses. This level of classification was expected to make time pressure more measurable and closer to a programmer's perception.

In the preliminary study, there were two activities carried out by the researcher:

1. Identifying the existing working conditions including time pressure circumstances in PLN by interviewing some PLN programmers.
2. Classifying time pressure levels based on the results from point 1.

4.1 The Working Condition in PLN

Researcher carried out face to face interviews during working hours in the STI Division with official permission from the PLN management. The list of questions containing and confirmation of the respondents availability were sent by researcher prior to the interview sessions.

The interviews on average were approximately 15 minutes. There were 10 questions asked to the interviewees:

1. How long have you been a programmer in PLN?
2. Normally, how many tasks are you responsible for in a day?
3. Would you please give me an example of your daily tasks?
4. Have you ever been involved in more than the usual tasks you are responsible for in a day?
5. What are your job's characteristics in general – a continuous job or a one-time completion job?
6. Does your job require you to work as an individual or in a team?
7. How often do you receive complaints from the user of the software you have developed?
8. Would you please give an example of activities you are involved in outside your daily job?
9. When you are working, have you experienced being interrupted by the management or surroundings?
10. How often do the management ask for job acceleration?

In summary, there were some points inferred from all the responses:

1. Mostly programmers are involved in more than 1 task a day.
2. The maximum number of job items they ever had in a day is five items.
3. In general, programmers at PLN are involved in continuous projects in teams.

4. Commonly, progress report meetings are held once every two weeks; however, there are other important meeting they have to attend each week such as meetings with the business process owner, supervision meetings with a third party, meetings with the user, meetings with the internal management of the STI Division etc.
5. The kinds of activities they involved are those such as corporate social responsibility events, SOP formulations, system audit preparations, and production of business process documentation.
6. Management commonly interrupts the programmers during working if there is an urgent need or an event which requires specific expertise from the programmers. In a high load situation, management often gives instruction to accelerate a job to ensure the task is completed on time.

4.2 Time Pressure Levels

4.2.1 Preliminary Study Methodology

In order to classify the perceived time pressure levels, researcher performed survey to the programmers at PLN and others similar companies. Using an online Google Form with 13 closed questions. A Likert 4-point Scale Response was applied to this preliminary survey with keyword labels as follow: 1. Relaxed; 2. Slight pressure; 3. Moderate Pressure; and 4. Great Pressure. These labels related to four classified time pressure levels (refer to Section 2.1.4.1). The questions were adjusted to conditions summarised in Section 4.1. as: number of working days in a week (D), number of tasks (T) and amount of pressure (P); and would be used to weight the time pressure level. Each question contains different weight and gradually increased from the lowest to the highest pressure condition in respect to time pressure levels. The weight of each question can be seen in the following table.

Table 3. The weight of each pooling survey question

Questions	Number of working days in a week (D)	Number of tasks (T)	Amount of Pressure (P)
Q1	1	1	0
Q2	1	0	0
Q3	1	2	1
Q4	1	2	2
Q5	1	2	3
Q6	1	2	4
Q7	1	3	3
Q8	1	3	2
Q9	*3*	*3*	*0*
Q10	1	1	0
Q11	3	1	4
Q12	5	1	4
Q13	5	2	4

The results were wighted based on the median value responsed by each programmer. The following is the list of questions designed for the pooling survey.

Table 4. List of questions for pooling survey

No.	Questions
1	What do you feel when you're asked by your superior to complete the routine without time limit and control from anyone?
2	What do you feel when you come to the office but you have nothing to do during the day?
3	What do you feel when in such situation you're completing a routine task without time limit, you have to attend an important meeting?
4	What do you feel when in such situation you're carrying out a routine task with 3 days time limit left, you have to attend an important meeting?
5	What do you feel when in such situation you're carrying out a routine task with 1 day time limit left, you have to attend an important meeting?
6	What do you feel when you're in such situation carrying out a routine task with few hours time limit left, you have to attend an important meeting?
7	What do you feel when you're in such situation carrying out a routine task with 3 days time limit left, you have to attend an important meeting where in the same meeting you're given other task with the same time limit as you are having at the moment?
8	What do you feel when you're in such situation carrying out a routine task with 3 days time limit left, you have to attend an important meeting where in the same meeting you're given other task without time limit?
9	What do you feel when in one week you're working (5 working days), 3 of 5 days you're required to do the routine task without time limit and control from anyone?
10	What do you feel when in one week you're working (5 working days), 1 of 5 days you're required to do the routine task without time limit and control from anyone?
11	What do you feel when in one week you're working (5 working days), 3 of 5 days you're required to do the routine task with time limit during the related day and will be controlled by your superior?
12	What do you feel when in one week you're working (5 working days), everyday you have routine task with time limit during the related day and will be controlled by your superior?
13	What do you feel when in one week you're working (5 working days), everyday you have routine and non routine tasks with time limit during the related day and will be controlled by your superior?
Answer	Relaxed Slight Pressure Moderate Pressure Great Pressure

4.2.2 Data Analyses

4.2.2.1 Sample Characteristics

In this research, the respondents were 70 programmers from PLN and similar companies. There were 60 respondents who completed the survey. Upon manual examination, 5 samples were classified as suspicious due to the straight-lining pattern and disqualified, thus the total number of respondents were 56. The respondents' characteristics are shown in the following table.

Table 5. Characteristics of respondents

Variable	Category	Frequency	Percentage
Job title	Programmer	60	100%
Gender	Male	27	45%
	Female	33	55%
Working experience	0 - 5	59	98%
	6 - 10	1	1.67%

4.2.2.2. Statistical Analysis

The median value is used to measure the central tendency as mentioned in Section 3.1.1.3.3.1. To measure the median value, firstly the researcher gave a score for each answer scale from 1 to 4 in accordance to time pressure level from the lowest to the highest. Secondly, the median value of all responses of each question was calculated. Next, the question was grouped together with other question which had the same median value i.e. question number 1,2,3,9 and 10 were grouped as shown in following table:

Table 6. example of question grouping

Questions	Number of working days in a week (D)	Number of Jobs (J)	Amount of Pressure (P)	Median Value
Q1	1	1	0	1
Q2	1	0	0	1
Q3	1	2	1	1
Q9	1	1	0	1
Q10	1	1	0	1

The median value represents the degree of time pressure they experienced. Hence, the lowest median value is considered as Relaxed and so on until the highest median value which is considered as Great Pressure.

Table 7. questions grouping according to pressure level

Questions	Number of working days in a week (D)	Number of Jobs (J)	Amount of Pressure (P)	Median Value	Result
Q1	1	1	0	1	Relax
Q2	1	0	0	1	
Q3	1	2	1	1	
Q9	1	1	0	1	
Q10	1	1	0	1	
Q4	1	2	2	2	Slight Pressure
Q8	1	3	2	2	
Q11	1	0.3	1.3	2	
Q12	1	0.2	0.8	2	
Q5	1	2	3	3	Moderate Pressure
Q7	1	3	3	3	
Q13	1	0.4	0.8	3.0	
Q6	1	2	4	3.5	Great Pressure

Due to time pressure levels are extracted from several questions which attributed to D, J and P, then a time pressure level is defined by median value of D, J and P as shown in Table 8.

Table 8. questions grouping according to pressure level with median value

Questions	Number of working days in a week (D)	Number of Jobs (J)	Amount of Pressure (P)	Median Value	Result
Q1	1	1	0	1	Relax
Q2	1	0	0	1	
Q3	1	2	1	1	
Q9	1	1	0	1	
Q10	1	1	0	1	
Median	1	1	0		
Q4	1	2	2	2	Slight Pressure
Q8	1	3	2	2	
Q11	1	0.3	1.3	2	
Q12	1	0.2	0.8	2	
Median	1	1	2		
Q5	1	2	3	3	Moderate Pressure
Q7	1	3	3	3	
Q13	1	0.4	0.8	3.0	
Median	1	2	3		
Q6	1	2	4	3.5	Great Pressure
Median	1	2	4		

4.2.3 Results

The conditions of each time pressure level from 56 responses were classified as shown in the following table.

Table 9. Classification of time pressure level

Questions	Number of working days in a week (D)	Number of Tasks (T)	Amount of Pressure (P)	Result	Conditions
Q1	1	1	0	Relaxed	D= 1 J= max 1 P= 0
Q2	1	0	0		
Q3	1	2	1		
Q9	1	1	0		
Q10	1	1	0		
Median	1	1	0		
Q4	1	2	2	Slight Pressure	D= 1 J= max 1 P= max 2
Q8	1	3	2		
Q11	1	0.3	1.3		
Q12	1	0.2	0.8		
Median	1	1	2		
Q5	1	2	3	Moderate Pressure	D= 1 J= max 2 P= max 3
Q7	1	3	3		
Q13	1	0.4	0.8		
Median	1	2	3		
Q6	1	2	4	Great Pressure	D=1 J= 2 or more P= 4 or more
Median	1	2	4		

From the results presented in table 9, the operational definition of each time pressure level is concluded as follow:

1. People perceive they are **relaxed** when, in a day, they are responsible for a maximum of one task without pressure from anyone.
2. People perceive **slight pressure** when, in a day, they are responsible for a maximum of one task and the maximum possibility of being pressurised is doubled.
3. People perceive **moderate pressure** when, in a day, they are responsible for a maximum of two tasks and the maximum possibility of being pressurised is three times.
4. People perceive **great pressure** when, in a day, they responsible for two or more jobs and the maximum possibility of being pressurised is more than four times.

Chapter 5. Data Analysis

There were three surveys conducted in this research: preliminary, initial and main surveys. All details about the preliminary survey including the performed test, results and conclusion have been discussed comprehensively in Chapter 4. The initial and main surveys will be discussed in this chapter.

The initial survey was held utilising a free online Google form platform. The targeted respondents were programmers in similar government companies as PLN. In the main survey, the questionnaire was distributed in two stages. The first aimed to obtain data to answer RQ1 and RQ2, whereas the second was especially designed to answer RQ3. To simplify the designation of each stage, the first stage was then called stage 1 and the second stage was called stage 2.

The targeted respondents were the same in the first and the second stages. They were all programmers in PLN and ICON who had a minimum of one-year's experience being programmers in such a company. Moreover, the platform used in the main survey was the same as that for the initial survey.

5.1 Data Validation

Each of the survey underwent data validation testing to be able to be analysed in depth. The details of each test of the initial and main surveys are explained in Sectiond 5.1.2 to 5.1.4. The result can be seen in the following table.

Table 10. The results for data validation

Surveys	Number of returned questionnaire	Amount of Missing Data	Number of Suspicious response rates	Number of Outliers	Number of valid data
Preliminary	67	0	11	0	56
Initial					
Part One	56	0	12	0	44
Part Two					
Part Three					
Part Four					
Main					
Part One	77	0	8	0	69
Part Two					
Part Three	93	0	13	0	70
Part Four					

5.1.2 Missing Data

The specific case of missing data occurs when a respondent either purposely or inadvertently leaves a blank answer for one or more questions. Consequently, to achieve zero missing data, the researcher utilised the "mandatory" feature in the online questionnaire platform to remind

respondents in a case where there were unanswered questions in a certain part. In Google form, the mandatory feature is marked as a star that can be assigned to each question. As a result, a total of 56 of the initial questionnaires, and 77 and 93 from parts 1 and 2, and parts 3 and 4 respectively from the main questionnaires were accepted without blank answers.

5.1.3 Suspicious Response Rate

Upon manual examination, 12 samples of the initial survey were classified as suspicious responses due to the straight-lining pattern of the answers. While a total of 8 and 13 samples respectively from the main surveys were suspected for the same reason. Therefore, all suspicious samples were eliminated from the dataset and the total number of valid respondents was 44, 69 and 70 respectively for the initial survey, stage 1 and stage 2 of the main survey.

5.1.4 Outlier Screening

In this research, outlier detection was performed using IBM SPPS version 20 with the results as shown in Figures 6 and 7 below.

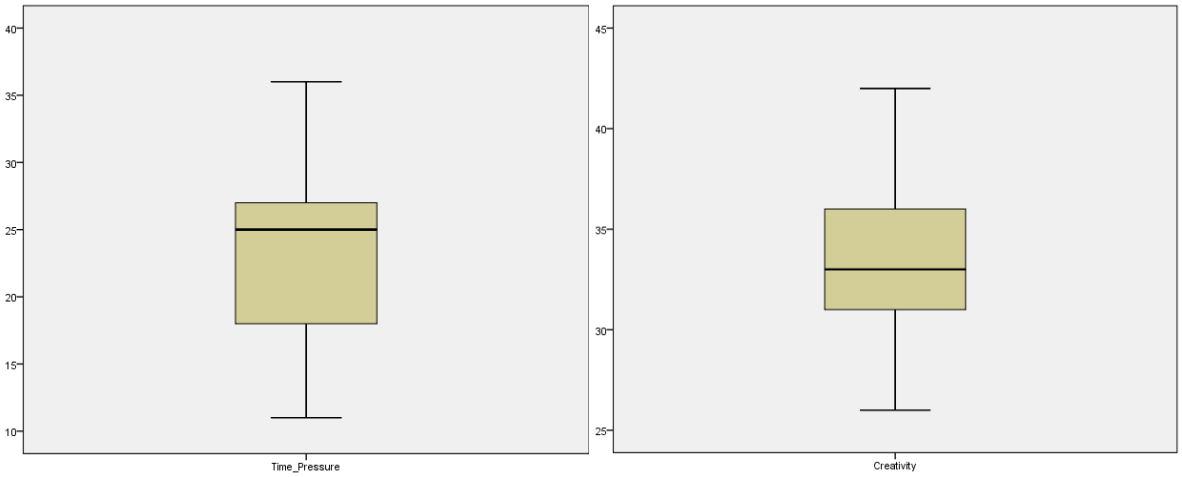


Figure 7. Outlier boxplot diagrams of the initial survey

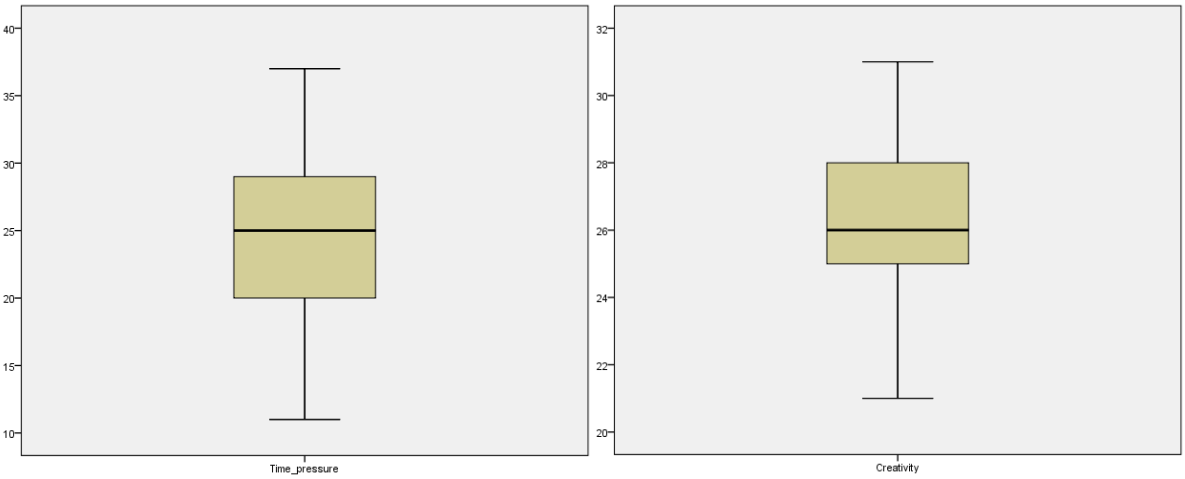


Figure 8. Outlier boxplot diagrams of the main survey

From Figures 7 and 8 there are two examined datasets as follow:

1. Two variables from the initial survey, time_pressure and creativity,
2. Two variables from the main survey, time_pressure and creativity.

The median value is shown as a bold line in the middle of each yellow box that divides such a box into two different large sizes. The Q1 value for each variable is shown on the bottom line of the yellow box, while the Q3 value for each variable is on the top line of the yellow box. The flat thin lines that are positioned in the highest and lowest parts of the diagram are respectively the highest value and the lowest value for each variable. Usually if IBM SPSS detects outliers or extreme values, then it will appear around the highest value or even higher or on the opposite side. Because there was no extreme value marked with a star (*) in those boxplots, then it can be assumed that there is no outlier value within the dataset and the data can be processed for the next steps of the research.

5.2 Validity and Reliability Test

5.2.1 Validity Test

5.2.1.1 Content Validity Test

To verify content validity, expert judgement from Dr. Werner Heijstek and Dr. Julia R. Wijnmaalen were employed to refine the instruments. From four parts of the questionnaire, it was advised that part three and four should be adjusted. In order to have robust content validity, the model of the questions was changed. Originally, part three was categorized as closed-importance format question which contained daily life story in organisation with certain pressure conditions. While part four was categorized as closed-likert format question which contained creativity process during programming activities in scale type question ("Research & Analysis," n.d). Later on, those two parts were correlated each other to find out the relationship between them. Due to different format question, the variables can' be correlated. Therefore, the expert demanded part three to be adjusted according to the format of part four. Overall, except for the adjustment of part three, the content of all the items in the questionnaire was declared valid.

All construct items were originally developed in English and translated into Bahasa Indonesia as the research survey was conducted in Indonesia.

5.2.1.2 Construct Validity Test

To ensure construct validity, the instrument was piloted among programmers or called initial survey. In order to keep the consistency of the answer, the targeted respondents involved in the initial survey were not those in the main survey. The respondents were programmers who worked in similar government companies in Indonesia. After data validation, there were 44

validated respondents involved in the survey which met the minimum requirement suggested by Sugiyono (2010).

Below is the correlation result for each factor or variable performed by IBM SPSS version 20 using Pearson product moment correlation technique analysis.

1. Table 11 shows the results of factor/variable analysis for part one of the initial questionnaire.

Table 11. Part one construct validity test

Correlations

		Item_01	Item_02	Item_03	Item_04	Total
Item_01	Pearson Correlation	1	.505**	.264	.202	.627**
	Sig. (2-tailed)		.000	.084	.188	.000
	N	44	44	44	44	44
Item_02	Pearson Correlation	.505**	1	.679**	.517**	.841**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	44	44	44	44	44
Item_03	Pearson Correlation	.264	.679**	1	.767**	.866**
	Sig. (2-tailed)	.084	.000		.000	.000
	N	44	44	44	44	44
Item_04	Pearson Correlation	.202	.517**	.767**	1	.805**
	Sig. (2-tailed)	.188	.000	.000		.000
	N	44	44	44	44	44
Total	Pearson Correlation	.627**	.841**	.866**	.805**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	44	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

2. Table 12 shows the results for factor/variable analysis for part two of the initial questionnaire.

Table 12. Part two construct validity test

Correlations

		Item_01	Item_02	Item_03	Item_04	Total
Item_01	Pearson Correlation	1	.138	.297*	.421**	.582**
	Sig. (2-tailed)		.366	.048	.004	.000
	N	45	45	45	45	44
Item_02	Pearson Correlation	.138	1	.824**	.476**	.802**
	Sig. (2-tailed)	.366		.000	.001	.000
	N	45	45	45	45	44
Item_03	Pearson Correlation	.297*	.824**	1	.578**	.879**
	Sig. (2-tailed)	.048	.000		.000	.000
	N	45	45	45	45	44
Item_04	Pearson Correlation	.421**	.476**	.578**	1	.844**
	Sig. (2-tailed)	.004	.001	.000		.000
	N	45	45	45	45	44
Total	Pearson Correlation	.582**	.802**	.879**	.844**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	44	44	44	44	44

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

3. Table 13 shows the results for factor/variable analysis for part three of the initial questionnaire.

Table 13. Part three construct validity test

Correlations

		Item_01	Item_02	Item_03	Item_04	Item_05	Item_06	Item_07	Item_08	Item_09	Item_10	Item_11	Total
Item_01	Pearson Correlation	1	.457**	.388**	-.037	.184	.294	.240	.101	.161	.005	.047	.329*
	Sig. (2-tailed)		.002	.009	.813	.232	.053	.117	.512	.298	.975	.761	.029
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_02	Pearson Correlation	.457**	1	.373*	.117	-.022	.391**	.082	.000	.202	.018	-.017	.300*
	Sig. (2-tailed)	.002		.013	.450	.888	.009	.595	1.000	.188	.908	.913	.048
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_03	Pearson Correlation	.388**	.373*	1	.158	.205	.217	.071	.122	.240	.159	.131	.386**
	Sig. (2-tailed)	.009	.013		.307	.182	.158	.646	.432	.117	.302	.395	.010
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_04	Pearson Correlation	-.037	.117	.158	1	.639**	.231	.504**	.570**	.226	.616**	.338*	.647**
	Sig. (2-tailed)	.813	.450	.307		.000	.132	.000	.000	.140	.000	.025	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_05	Pearson Correlation	.184	-.022	.205	.639**	1	.358*	.650**	.559**	.305*	.704**	.532**	.762**
	Sig. (2-tailed)	.232	.888	.182	.000		.017	.000	.000	.044	.000	.000	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_06	Pearson Correlation	.294	.391**	.217	.231	.358*	1	.397**	.398**	.392**	.476**	.343*	.645**
	Sig. (2-tailed)	.053	.009	.158	.132	.017		.008	.007	.008	.001	.023	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_07	Pearson Correlation	.240	.082	.071	.504**	.650**	.397**	1	.758**	.402**	.555**	.657**	.796**
	Sig. (2-tailed)	.117	.595	.646	.000	.000	.008		.000	.007	.000	.000	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_08	Pearson Correlation	.101	.000	.122	.570**	.559**	.398**	.758**	1	.511**	.658**	.574**	.799**
	Sig. (2-tailed)	.512	1.000	.432	.000	.000	.007	.000		.000	.000	.000	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_09	Pearson Correlation	.161	.202	.240	.226	.305*	.392**	.402**	.511**	1	.386**	.373*	.619**
	Sig. (2-tailed)	.298	.188	.117	.140	.044	.008	.007	.000		.010	.013	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_10	Pearson Correlation	.005	.018	.159	.616**	.704**	.476**	.555**	.658**	.386**	1	.679**	.809**
	Sig. (2-tailed)	.975	.908	.302	.000	.000	.001	.000	.000	.010		.000	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Item_11	Pearson Correlation	.047	-.017	.131	.338*	.532**	.343*	.657**	.574**	.373*	.679**	1	.728**
	Sig. (2-tailed)	.761	.913	.395	.025	.000	.023	.000	.000	.013	.000		.000
	N	44	44	44	44	44	44	44	44	44	44	44	44
Total	Pearson Correlation	.329*	.300*	.386**	.647**	.762**	.645**	.796**	.799**	.619**	.809**	.728**	1
	Sig. (2-tailed)	.029	.048	.010	.000	.000	.000	.000	.000	.000	.000	.000	
	N	44	44	44	44	44	44	44	44	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4. Table 14 shows the results for factor/variable analysis for part four of the initial questionnaire.

Table 14. Part four construct validity test

Correlations

		Item_01	Item_02	Item_03	Item_04	Item_05	Item_06	Item_07	Item_08	Item_09	Item_10	Item_11	Item_12	Total
Item_01	Pearson Correlation	1	.237	-.044	.153	-.098	.070	.068	-.022	-.039	-.043	.082	.097	.328*
	Sig. (2-tailed)		.122	.777	.321	.528	.653	.662	.888	.802	.780	.598	.531	.030
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_02	Pearson Correlation	.237	1	.190	.032	.000	.164	-.072	-.076	.148	.170	-.087	.052	.331*
	Sig. (2-tailed)	.122		.217	.837	1.000	.288	.642	.623	.338	.271	.574	.739	.028
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_03	Pearson Correlation	-.044	.190	1	-.023	.206	.367*	.473**	.286	-.183	.298*	-.269	.077	.493**
	Sig. (2-tailed)	.777	.217		.883	.180	.014	.001	.060	.235	.050	.077	.621	.001
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_04	Pearson Correlation	.153	.032	-.023	1	-.094	-.140	-.240	-.031	.384*	-.260	.233	-.151	.232
	Sig. (2-tailed)	.321	.837	.883		.545	.365	.117	.844	.010	.088	.128	.327	.130
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_05	Pearson Correlation	-.098	.000	.206	-.094	1	.306*	.224	.460**	-.055	.278	.000	.248	.488**
	Sig. (2-tailed)	.528	1.000	.180	.545		.043	.143	.002	.724	.068	1.000	.104	.001
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_06	Pearson Correlation	.070	.164	.367*	-.140	.306*	1	.542**	.508**	-.310*	.518**	-.120	.335*	.646**
	Sig. (2-tailed)	.653	.288	.014	.365	.043		.000	.000	.040	.000	.439	.026	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_07	Pearson Correlation	.068	-.072	.473**	-.240	.224	.542**	1	.349*	-.540**	.461**	-.247	.403**	.487**
	Sig. (2-tailed)	.662	.642	.001	.117	.143	.000		.020	.000	.002	.106	.007	.001
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_08	Pearson Correlation	-.022	-.076	.286	-.031	.460**	.508**	.349*	1	-.158	.466**	-.066	.419**	.648**
	Sig. (2-tailed)	.888	.623	.060	.844	.002	.000	.020		.305	.001	.669	.005	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_09	Pearson Correlation	-.039	.148	-.183	.384*	-.055	-.310*	-.540**	-.158	1	-.305*	.395**	-.286	.031
	Sig. (2-tailed)	.802	.338	.235	.010	.724	.040	.000	.305		.044	.008	.060	.842
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_10	Pearson Correlation	-.043	.170	.298*	-.260	.278	.518**	.461**	.466**	-.305*	1	-.085	.234	.542**
	Sig. (2-tailed)	.780	.271	.050	.088	.068	.000	.002	.001	.044		.582	.126	.000
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_11	Pearson Correlation	.082	-.087	-.269	.233	.000	-.120	-.247	-.066	.395**	-.085	1	-.150	.163
	Sig. (2-tailed)	.598	.574	.077	.128	1.000	.439	.106	.669	.008	.582		.332	.292
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Item_12	Pearson Correlation	.097	.052	.077	-.151	.248	.335*	.403**	.419**	-.286	.234	-.150	1	.444**
	Sig. (2-tailed)	.531	.739	.621	.327	.104	.026	.007	.005	.060	.126	.332		.003
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Total	Pearson Correlation	.328*	.331*	.493**	.232	.488**	.646**	.487**	.648**	.031	.542**	.163	.444**	1
	Sig. (2-tailed)	.030	.028	.001	.130	.001	.000	.001	.000	.842	.000	.292	.003	
	N	44	44	44	44	44	44	44	44	44	44	44	44	44

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Referring to the critical value of the Pearson's r table, for N = 44 respondents at the confidence level (α) = 95% the r *table* is 0.297 whereas at α = 99% the r table is 0.384. Therefore, in accordance with the facts described above, it can be concluded as follows:

1. In part one, there is no r *value* less than r *table* which means that all the questions are valid at α = 0.01.
2. In part two, there is no r *value* less than r *table* which means that all questions are valid at α = 0.01.
3. In part three, there is no r *value* less than r *table* which means that all questions are valid at α = 0.05
4. In part four, the r *value* of Item_04, Item_09 and Item_11 are 0.232, 0.031 and 0.163 respectively which are below 0.297. Means invalid at α = 0.05. Then, those items must be eliminated from part four of the questionnaire.

This means that 28 items from all parts have construct validity.

5.2.2 Reliability Test

To ensure the number of individual items in the questionnaire measure the same characteristics for the same construct, the researcher carried out two kinds of statistic technique analysis due to the different types of data. The first was Cronbach's alpha utilised for parts one, three and four and the second was KR-20 for measuring part two.

Table 15. Part one's Cronbach's Alpha value

Reliability Statistics

Cronbach's Alpha	N of Items
.784	4

Table 16. Part two's KR-20 value

Reliability Statistics

n	4
Σpq	0.526
var	1.262
KR20	**0.778**

Table 17. Part three's Cronbach's Alpha value

Reliability Statistics

Cronbach's Alpha	N of Items
.855	11

Table 18. Part four's Cronbach's Alpha value

Reliability Statistics

Cronbach's Alpha	N of Items
.721	9

As can be seen from Tables 15 to 18, both the three Cronbach's Alpha values and the KR-20 values show that all the values are above 0.7 which suggests that all the items have relatively high internal consistency. Because the closer to 1 the value is, the more reliable the item is or, in other words, the more likely the items are to be measuring the same construct, the values for internal consistency for each part are as follow:

1. In part one, the Cronbach's alpha value is 0.784 out of 4 items.
2. In part two, the KR-20 value is 0.778 out of 4 items.
3. In part three, the Cronbach's alpha value is 0.855 out of 11 items.
4. In part four, the Cronbach's alpha value is 0.721 out of 9 items.

In summary, a total of 28 items in the questionnaire are reliable to be used in the main survey.

5.3 Assumption Test

5.3.1 Normality Test

In accordance to find out whether the parametric statistic can be used in this research, a normality test was performed using a Kolmogorov-Smirnov (K-S) test. The dataset for the test was data obtained from the main survey to answer RQ3. The researcher specified only this dataset to be tested because it was only this dataset that needed to have a normal data distribution. When it is normal, then the Pearson Product Moment Correlation for parametric statistics analysis can be utilised to measure the objective of RQ3 as a relationship-based question. Datasets obtained from the preliminary study and the initial survey were intended to answer RQ1 and RQ2 respectively, which are both descriptive questions. In other words, analysing those two questions didn't need parametric or non-parametric statistics.

As mentioned in Chapter 3, to carry out the test, the researcher proposed the statistical hypotheses mentioned below:

H0 : Data distribution does not deviate from Gaussian distribution

H1 : Data distribution deviates from Gaussian distribution

The results were as follow:

Table 19. K-S test of dataset from the main survey

One-Sample Kolmogorov-Smirnov Test

		perceived_time_pressure_main_survey	creativity_main_survey
N		70	70
Normal Parameters[a,b]	Mean	23.04	26.47
	Std. Deviation	6.533	2.152
Most Extreme Differences	Absolute	.075	.142
	Positive	.060	.132
	Negative	-.075	-.142
Kolmogorov-Smirnov Z		.624	1.187
Asymp. Sig. (2-tailed)		.831	.120

a. Test distribution is Normal.

b. Calculated from data.

Table 19 describes the examination of the K-S test for 70 respondents from the main data survey using IBM SPSS version 20. The measured variables are perceived time pressure and creativity. The D *empirical* value is shown as an Absolute value. According to the table of critical value for Kolmogorov-Smirnov, for 70 respondents with a 95% critical value (alpha = 0.05), the D *table* value is 0.160. From Table 19, it can be assumed:

1. For the perceived time pressure variable, the absolute value 0.75 is less than 0.160, which means the data is normally distributed.
2. For the creativity variable, the absolute value 0.142 is less than 0.160 which means the data is normally distributed.
3. For the Z value for the perceived time pressure variable 0.624 is less than 1.96 which means it is significant at $P < 0.05$.
4. For the Z value for the creativity variable 1.187 is less than 1.96 which means it is significant at $P < 0.05$.

From the histogram below, it can also be seen obviously that the datasets for both variables are normally distributed.

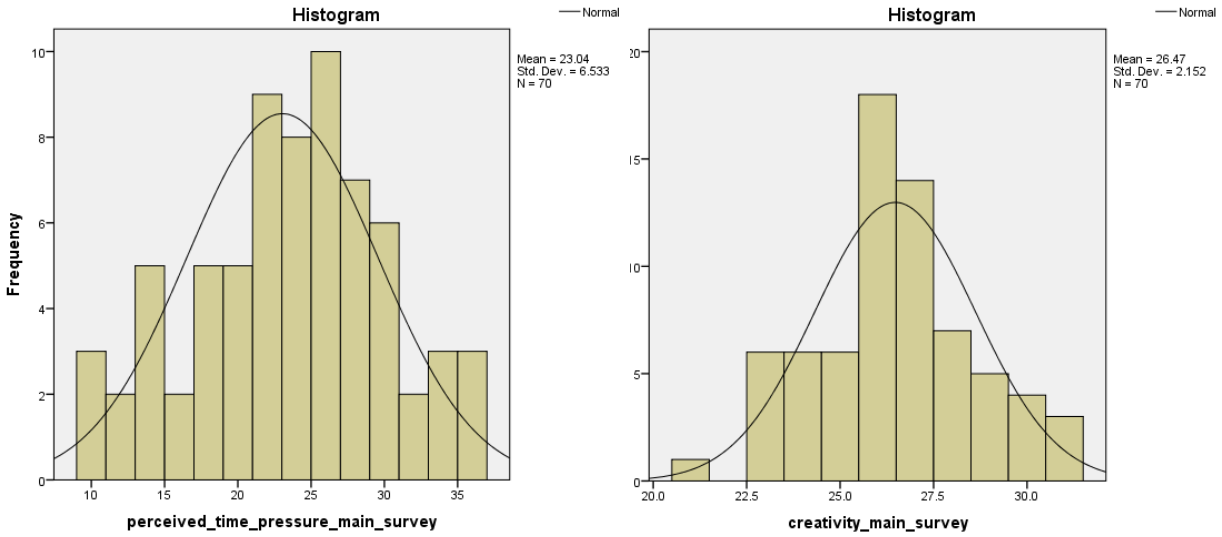


Chart 1. The data distribution for datasets from the main survey

Considering the facts mentioned above, it can be concluded that the dataset for the main survey is normally distributed. Therefore, H0 is accepted while H1 is rejected. Moreover, this result ensures that it is suitable for the analysis using the Pearson Product Moment Correlation which is the parametric statistical analysis.

Chapter 6. Research Question 1 Analysis

6.1 Perceived Time Pressure

In this chapter, the researcher will describe the data processing and analysis of the main survey using a statistical method particularly to answer RQ1.

6.1.1 The Questionnaire Models

To present the results for the amount of time pressure that programmers perceived while working at PLN, the researcher asked the respondents one question in part 1 of the questionnaire through the stage 1 survey.

Table 20. Part 1 questionnaire design

Question:	Technical Jobs sometimes involve working under time pressures exerted by other people – results are needed urgently, there are deadlines to be met etc. According to your working experience as a programmer, in a typical day about what percentage of your time is spent under the following or similar conditions of pressure during working? (Andrews & Farris, 1972) Condition: 1. I feel relaxed all the time or I only need to do my routine task every day 2. I need to finish my routine efficiently since the deadline is tomorrow. My Supervisor always asks about progress. 3. While I'm doing my routine that is due today, I have another subsequent task waiting to be done shortly and the report needs to be finished on the same day. 4. I feel there is not time to finish several pending tasks that should be submitted shortly while I'm still preparing for a presentation for today meeting.
Answer:	1. ……. % 2. ……. % 3. ……. % 4. ……. %

The condition of pressure in the question was developed based on the formulated pressure levels: relaxed; slight pressure; moderate pressure; and great pressure. Condition number 1 reflects a relaxed level, condition number 2 reflects a slight pressure level and so on.

The type of question is open-ended. However, considering this research is quantitative research, the respondents were expected to answer only by indicating the amount of pressure they experienced at each level of pressure, as a percentage. The four answers field were provided in corresponding to the condition number i.e. the answer to condition number 1 should be answered in field 1 and so on. To lead respondents to fill in the expected answer, the researcher put the symbol “%” at the end of the answer field.

6.1.2 The Statistical Analysis

The researcher needed to investigate the mid amount of the highest value for each time pressure level perceived by the programmers. The highest value equals the most frequent time pressure s/he has experienced in the workplace. Hence, based on the answers, it can be interpreted that s/he is working in a company that has time pressure at the level s/he has mentioned.

To have the mid amount of the grouped highest value, the statistical median approach was used due to the reason mentioned in Section 3.1.1.3.3.1. Beforehand, the dataset needed to be compiled to be ready for median calculation.

1. Each response was treated as a point. The respondents were classified into a specific time pressure level to signify that s/he is someone with a tendency to a particular time pressure level. The classification can be done by determining the highest value within four answers s/he has put. For example, someone who put the answers: 1. 15%; 2. 25%; 3. 35%; 4. 25% would be grouped into moderate pressure because the highest value is the number 3. 35% which indicates a moderate pressure level. This response is then counted as 1-point voting for moderate pressure. Another possibility may occur when someone puts two or more answers with the same value as the highest; they will then be classified in both levels in half portion in each level. For example, someone who put the answer: 1. 30%; 2. 40%; 3. 70%; 4. 70% would be grouped into moderate pressure and great pressure and would be counted as 0.5 and 0.5 points respectively voting for moderate pressure and great pressure.
2. The median value of each grouped of the highest value is then calculated.

6.1.3 The Results and Discussion

From the statistical method mentioned above, there are 69 respondents grouped into four time pressure levels. The results are presented in the following table.

Table 21. Results of the most frequent time pressure levels experienced as percentage of respondents

Time Pressure levels	Number of respondents who voted (Person)
Relaxed	11.5
Slight Pressure	12
Moderate Pressure	28.5
Great Pressure	17
Total	**69**

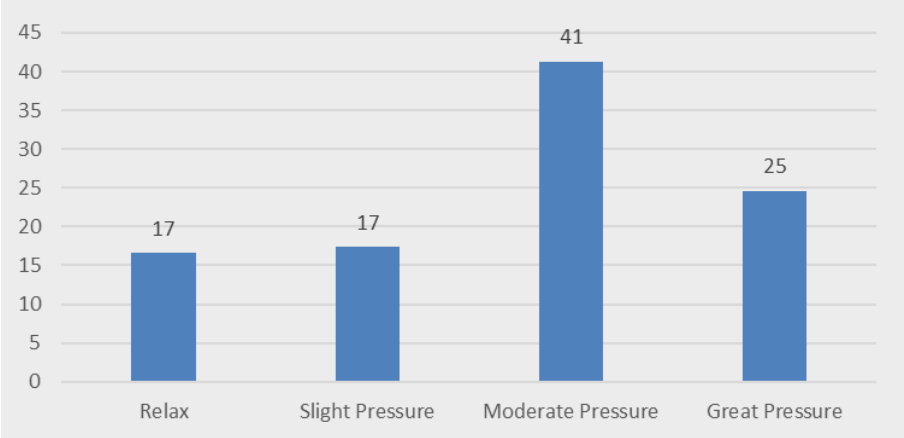


Chart 2. Results of the most frequent time pressure levels experienced as percentage of respondents

Chart 2 shows 41% of programmers involved in the research believed that during their working time at PLN, are spent on activities of moderate urgency. During peak season, on average they were involved in two tasks with up to three times the pressure from both management and surrounding to accelerate or to focus on the task they are responsible for each day. Then, 25% of programmers argued that the tasks they handle mostly have great urgency with the possibility of more than four times the amount of pressure conveyed to emphasise the delivery time. In total, 17% of programmers spent their time on activities for which they experienced no urgency at all or slight pressure on it. The sense of no urgency implies every day mostly they are responsible for only one task or even no task at all without any instruction to accelerate delivery. This is different to those who experience slight pressure, who are asked to accelerate their task even though the task amount is the same as for those who felt relaxed.

To settle RQ1, **how much time pressure is experienced by the programmer,** and to disclose this real condition to the management of PLN, this research presents data with respect to the median value of the most frequent time pressure perceived by the programmers at PLN.

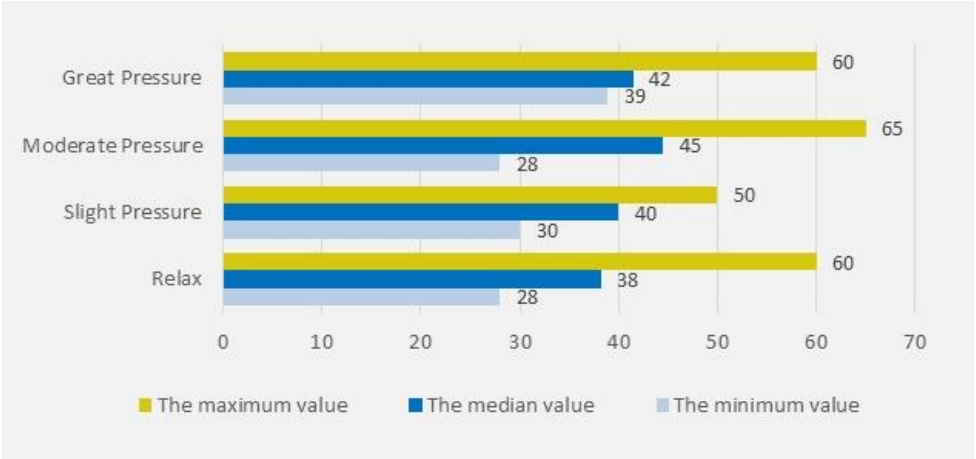


Chart 3. The median value for the most frequent time pressure perceived as a percentage of value

For Chart 3, the green bars describe the median value of the percentage of the most frequent time pressure perceived by programmers with the maximum and minimum values shown in dark blue and light blue. Returning to RQ1 by means of a median value analysis, the amounts of time pressure perceived by programmers at PLN are: relaxed pressure 38%, slight pressure 40%, moderate pressure 45% and great pressure 42%.

According to the statement of FM, a senior manager, management intend to apply time pressure to push the programmers´ motivations. The findings in this research clearly show that the pressures applied by the management are truly experienced by the programmers. This is obviously presented in Graph 1 where it can be seen that a total of 66% of programmers responded that they experience a relatively high time pressure level (moderate and great pressure). However, it cannot be generalised to the experiences of all programmers since time pressure is subjective and may be perceived differently by each individual. In total, 34% of programmers considered themselves to face only a slight or even less pressure level.

Even though some research acknowledges the importance of time pressure in an organisation (Andrews & Farris, 1972; Hazzan & Dubinsky, 2007; Kühnel, Sonnentag, & Bledow, 2012), according to Weisinger and Pawliw-Fry (2015), time pressure can negatively impact on performance and leadership. In a software engineering related research: time pressure increases errors and decreases software quality (Cataldo, 2010). It influences the emotional brain and the employees´ thinking processes. These signs refer to programmers´ physical conditions, such as having health problems due to physical and mental exhaustion following several days' nonstop coding activities. Considering these implications, the management of PLN should be aware of the real conditions and seek appropriate strategies to avoid the worst time pressure impacts on programmers.

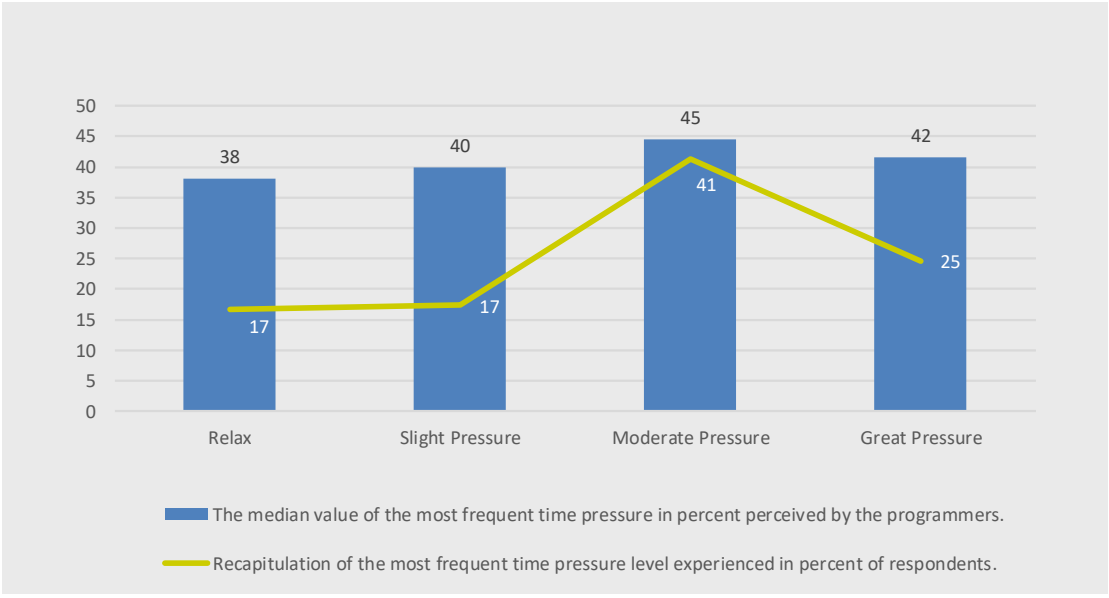


Chart 4. The number of programmers who experienced time pressure and the perception of how much time pressure they experienced

Interestingly, as shown in Chart 4, moderate pressure was the highest pressure level voted for by programmers and also the highest median value for the most frequent time pressure perceived by the programmers. Both the number of programmers who experienced time pressure and the perception of how much time pressure was perceived significantly refer to high pressure. This confirms the statements uttered by some programmers in the exploratory interviews which suggested that the pressure experienced by programmers at PLN is relatively high.

As defined by the programmers, a moderate pressure level is a work load with a maximum of 2 items per day and a great pressure level is a work load with more than 2 items per day. Due to the perception that the amount of pressure in this research indicated great pressure levels, there are more than 2 items of work in a day to be completed with more than 4 times the amount of time pressure experienced. Considering that the working hours at PLN are 8 hours per day with a total of 40 hours per week, the management of PLN is required to evaluate the work items given to programmers which correspond to daily working hours at PLN to make sure that 8 hours per day is enough for doing such items. From a job description point of view, taking account of that fact that a programmer´s role goes beyond what is in the description list, the management should consider evaluating this as well as other important matters. It would be more reasonable if the work items other than those in the job description were reduced, and then the total work items in a day would be less and time spent on the reduced work items could be allocated to other work items to improve the quality of work thus overtime situations could be avoided.

Chapter 7. Research Question 2 Analysis

7.1 The Maximum Time Pressure

In this chapter, the researcher will describe the data processing and analysis of the main survey using a statistical method particularly to answer RQ2.

7.1.1 The Questionnaire Models

In part 2 of the questionnaire, the researcher asked four questions of respondents through the stage 1 survey.

Table 22. Part 2 questionnaire design

1. Question: Answer:	Do you think you can finish all tasks excellently when you're asked by your superior to do a routine task without time limit? Yes I can or No, I can't
2. Question: Answer:	Do you think you can finish all tasks excellently when everyday you have a routine task with time limit? Yes I can or No, I can't
3. Question: Answer:	Do you think you can finish all tasks excellently when everyday you are responsible for two routines tasks with strict deadline? Yes I can or No, I can't
4. Question: Answer:	Do you think you can finish all tasks excellently when in one day you are responsible for 4 tasks: 1 task should be done tomorrow while the other three tasks are due in two weeks from now. While in the same time you have a call from your manager asking you to join a new program language training. Yes I can or No, I can't

In the questionnaire, the respondents were given four working situations and each situation described a similar working condition with a real workload. The workload level was defined based on preliminary data conclusions from the lowest to the highest level respectively as: relaxed; slight pressure; moderate pressure; and great pressure. Question 1 represents the lowest level and so on down to the last question. Workload in the slight pressure level is higher than for the relaxed level and so on up to a great pressure level. And lastly, they were asked whether, in such a situation, they could still complete the job excellently.

The type of question is a dichotomous question because the answer is either Yes or No. The answer options were provided to avoid diversity of responses. The respondents answered by selecting only one of two given options: “Yes, I can” or “No, I can’t”.

7.1.2 The Statistical Analysis

The aim of questionnaire part 2 was to explore what level of time pressure the programmer perceived as the maximum they could accept while still giving excellent results.

To obtain the expected result, for each respondent's response, the researcher needed to determine one of four answers as the highest level. The highest level according to the respondent's perception may not be the same as the definition. Precisely, the selected answer from the respondent represents how far the programmer can perform excellently.

The maximum time pressure level perceived by programmer is obtained by the responses of "Yes, I can" on the highest pressure level among these four pressure level situations, responses on the lower pressure level situation will not be accounted.

For example, someone who answered: 1. Yes, I can; 2. Yes, I can; 3. No, I can't; 4. No, I can't; would be grouped into the slight pressure level since the highest pressure level of answers "Yes, I can" is number two (slight pressure level). Someone who selected: 1. No, I can't; 2. Yes, I can; 3. No, I can't; 4. Yes, I can, would be grouped into the great pressure level since the highest pressure level of answers "Yes, I can" is number 4 (great pressure level). The results from each programmer were grouped with others whose results also fell into the same level of time pressure.

Finally, results analysis of RQ2 are presented in percent of number of programmer in each group.

7.1.3 The Result and Discussion

A total of 69 respondents answered part two of the stage 1 survey. The results for the maximum level for all respondents can be seen in the following table.

Table 23. The maximum level of time pressure programmers perceived

Time Pressure Categories	Respondents's Maximum Time Pressure Level (Person)
Relaxed	12
Slight Pressure	28
Moderate Pressure	21
Great Pressure	8
Total	**69**

Relaxed as the lowest time pressure level

As many as six responsed to "No, I can't" at the lowest time pressure level. These six respondents were those who had been working in software engineering for a period of 1 to 5 years aged around 24 to 30 years. Literally, regarding the education level of the respondents, it can be synthesised that those with a minimum diploma educational background would likely to be successfully in completing the job item at the lowest time pressure level, because, as defined by the programmers, the relaxed

pressure level is a work load with a maximum of 1 item per day without pressure from anyone. Thus, when a programmer feels unable to complete the corresponding job item excellently at this time pressure level, it can be assumed that the main cause is not because of knowledge and ability barriers, but due to other reasons. Job satisfaction is a positive emotional circumstance which results from work experiences (Locke, 1976). There are five factors that utter job satisfaction: success and achievements at work; estimation; work itself; responsibility and progress; whereas five other factors like administration and policies, supervision, salary, interpersonal relations and work conditions are determiners to job dissatisfactions (Hercberg, Mausner, & Drankoski, 1959). Research on relationships between job satisfaction and demography for education professions carried out by Rapti and Karaj discovered that teachers with a university degree background are more dissatisfied compared to those with a high school diploma background (Rapti & Karaj, 1959). They also added, older teachers are more satisfied than younger teachers.

This research also confirmed the same result that programmers aged between 24 and 30 years old or those who are classified into a younger age group and lack professional experiences tend to search for challenges than just simple relaxed situations to excellently complete a job or to achieve work satisfaction. These six programmers can be inferred not to have work satisfaction at a relaxed time pressure level. The triggering factors may be related to work conditions. Considering the moderate pressure level of work conditions at PLN (as described in section 6.1.3), as a consequence, these programmers should have been adapted to a higher working rhythm. And ultimately, at a relaxed time pressure level they are not ver well motivated.

A similar suggestion is also conveyed by Linzer et al. (2000) that time pressure detracts 30% from job satisfaction, carrier and specialty satisfaction for physicians and eventually a higher time pressure is prone to decrease job satisfaction. Despite having the same effect leading to job satisfaction, earlier research in contrast suggested that a time pressure level beyond relaxed pressure is necessary to increase job satisfaction.

Finally, it can be concluded that basically time pressure is required at a higher level other than a relaxed level up to a certain level before it starts to induce dissatisfaction amongts programmers.

Great as the highest time pressure level

There were only eight who responsed to be able to complete the work excellently at great pressure level. As per the definition, under great pressure they must complete more than 3 job items per day along with having more than 4 times the pressure from the management or surroundings. Interestingly, they felt capable of being in such high pressure situations, yet their professional experiences ranged between 1 and 5 years and only two of them had more than 5 years of

experience. And more surprisingly, 7 out of the 8 responded that the median condition for time pressure at PLN lay between moderate and great pressure. There were no references in the liberature review which concluded that the more time pressure the tougher people would be. Those who felt the workplace was at high pressure are those who believed they could survive in such conditions. However, this research only focuses on pressure level perceived by programmers, not on the character of the programmer. Thus, it cannot be clearly identified whether there is any relation between the programmers' characters and their ability to work under pressure.

One other possible motivation why they still feel able to work in such high pressure conditions may be due to the fact that they are working in a government company where the social security is highly assured, such as through lifetime health insurance for employees and a pension, good take home pay standards compared to other private enterprises, talent pooling for the good performance employees and low risk of discharge threat. At PLN, the employee turnover rate is extremely low. According to the data from the human resources division, in 2016, only 0.22% employees submitted a letter of resignation. And in 2017, the quit rate slightly increased to 0.3%. This number has no significance when applied to 44,080 and 46,222 employees in PLN in 2016 and 2017 respectively. Interestingly, no programmer was identified among those who had quit. Hence, it can be concluded that the loyalty of employees goes hand in hand with a satisfaction and benefits offered by the company. To sum up, at PLN, there is no tendency for higher time pressure to lead to higher employee turnover which is contrary to Linzer et al. (2000), who proved a higher turnover of workforce in companies with higher time pressure. Moreover, this finding is in agreement with Maier and Brunstein suggestion that job satisfaction is one of 3 factors influencing employment discharge (Maier & Brunstein, 2001).

The maximum time pressure perceived by the programmer

Detailed analysis at the most chose level, slight pressure, against demography showed various results. A total of 28 programmers believed they can work remarkably at this level of pressure. From the age background, they are in the range of 20 to 34 years old with professional experience starting from 1 to 15 years. Therefore, no pattern can be identified to support their motivations to responsed to this level pressure. However, when correlated with the conclusion that at a relaxed level, time pressure is indeed required at slight pressure level which is higher of a relaxed pressure level. Nevertheless, levels higher than slight pressure are perceived to give negative effects.

Hence, to answer RQ2, ***What level of time pressure do programmers consider maximum*****?**, then in percentage form, the analysis results can be seen from the graph below.

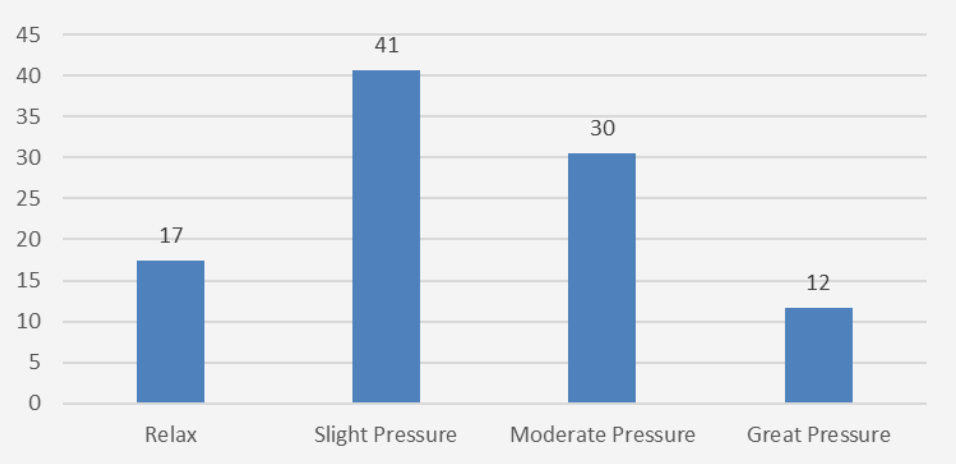


Chart 5. Respondents' maximum time pressure level as a percentage of respondents

From Chart 5, it is concluded that the most chosen level shows that 41% of respondents perceived they are working at their maximum at a Slight Pressure level, whereas only 12% of respondents considered that, even under great pressure conditions, they could still complete the work excellently. Furthermore, as many as 30% and 17% of respondents chose moderate and relaxed level respectively.

Based on the expectations from the findings of RQ 2, it can be concluded that a slight pressure level is the best to grow motivation in terms of time pressure on programmers. Whenever time pressure is applied at lower than slight pressure, then the motivation is perceived not to satisfy the programmers' expectations. And when applied at a level higher than a slight pressure level, the motivation is indeed perceived negatively by the programmers.

Other findings in this research indicate that time pressure improves work productivity. This also confirmed the research carried out by Kelly and Karau (Kelly & Karau, 1999) and Amabile (Teresa M. Amabile et al., 2002) that *time pressure has been found to increase productivity*. In accordance with the exploratory interview results when a deadline is due, there are efforts from the programmers to extend their working hours beyond the office hours in order to complete their task items. This can be proved by looking at the correlation between the pressure and workload situation in the questionnaire (Table 19) and the results (Chart 5). When the delivery time or the efforts to emphasise the progress of work at all levels of time pressure even at great pressure levels is accelerated, all programmers are still able to complete the task items. This is supported by a statement from FM, a senior manager, that so far all task items can be completed by the programmers, even though there are overtime consequences. Overtime or prolonged working duration refers to productivity escalation.

Furthermore, besides confirming the relationship between time pressure and productivity, the findings in this chapter have also described the work quality from productivity itself. In this research, work quality is evaluated by the response of programmers to the maximum pressure they withstand to complete work excellently. Excellence is defined as the highest quality level of related work. From the above table, the best work quality is produced when slight pressure is applied. However, when levels higher than slight pressure are applied, the work quality will decrease. This can be seen in Chart 5 for the number of programmers who can complete the job items excellently is less at levels higher than slight pressure. When the time pressure is applied at a moderate level, approximately 70% of programmers can complete the job items, but not at their best quality. Moreover, 88% of programmers failed when the time pressure is set at the great pressure level.

Taken together with the previous findings, time pressure will improve working productivity but the working quality may be become poorer.

Chapter 8. Research Question 3 Analysis

8.1 The Relationship between Time Pressure and Creativity

In this chapter, the researcher will describe the data processing and analysis of the main survey using a statistical method particularly to answer RQ 3.

8.1.1 The Questionnaire Models

There are two parts, part 3 and part 4, to the stage 2 questionnaire which aimed to test the hypotheses. Since the hypotheses are based on the relationship between time pressure and creativity, then those two parts are designed equally to be correlated. On the strength of the preliminary results about time pressure levels and about the working conditions of programmers at PLN, also based on the questionnaire construction, the researcher designed a questionnaire that can be seen in the following table.

Table 24. Part 3 questionnaire design

Dimension	No	Items	Answers
		To what extent to you feel time pressure if ….	
Work Overload	1	I'm asked to fix a bug in a program that just launched last month and submitting the result whenever I finish.	4-Likert Scale Response: 1. I don't feel pressure 2. Feeling some pressure 3. Feeling pressure 4. Feeling a lot of pressure
	2	Supervisor asks me to create library of basic code that can be modified or customised for a specific application. He asks me to conduct the task in a team.	
	3	I have new task to build programs (let's call as Program A). The management gives 4 weeks to develop and trial run the program.	
	4	When I'm working on program A that the remain time limit is 2.5 weeks away, a teammate asks me to explain the logic of program A he is working on whereas this part must be finished tomorrow afternoon.	
	5	Supervisor asks me to simplify the program A writing code while I'm still focusing on writing the other part. However, he doesn't put time allocation for doing such matter.	
	6	When the time limit of program A is only 1 week away, I have to present program A progress report in weekly meeting and at the same time manager asks me to review the current database capability in a week.	
	7	When the time limit of program A is only 1 week away while at the same time I also need to focus on Database review, my teammate report me that her part in program A overlaps with mine. The remain time before trial run is only 3 days away.	
	8	When the time limit of program A is only 4 days away while at the same time I also need to focus on Database reviewing, I find there is part in my coding in program A that potentially become error.	
	9	When the deadline of program A is in two days away, I need to analyse the system to ensure program A run efficiently while in the same time a report about Database review should be done. I also need to participate in Corporate Social Responsibility (CSR) program that will start in two weeks.	
	10	The deadline of program A is tomorrow yet I have not finished testing. At the same time I find error that need to be repaired as soon as possible. Supervisor also asks me to prepare progress report for tomorrow meeting.	
	11	The progam A is due today, yet the management ask me to involve in Change Request (CR) of program B that should be done in two weeks. While in the same time I'm still doing the documentation of program A. In such situation, I'm also waiting for the report in case there is an error in program A during testing.	

Table 24 shows the 11 items of the questionnaire in part 3 which aim to obtain the responses on perceived time pressure if the programmers are in a given situation.

At a glance, it seems the aim is the same as that for the questionnaire in part 1. However, if this is seen from a content point of view, those two parts are different. Part one is targeted at measuring how much programmers experience in each time pressure level while part three is as mentioned above. Moreover, the questionnaire information about the part objective and how to fill are mentioned clearly in each part. In addition, to prevent the occurrence of respondent's boredom, these two parts were distributed at different implementation times (stage 1 and stage 2). Hence, the concern about respondents misunderstanding can surely be avoided.

The items were built based on the dimension of time pressure: work overload, which is the independent variable of the research. As mentioned above that programmer is set in similar situation to their daily circumstances in PLN. The actual situation was obtained from interviews as a part of the preliminary study as discussed in Section 4.1. By performing this, it was expected that the answer would reflect the real programmers' perception of the time pressure conditions at PLN. The interviews' outcome was then collaborated with time pressure levels to create different levels of time pressure situations.

The 11 items in this part were intended to meet the delineation of four-time pressure levels. Each item relates to one time pressure level. Items 1 and 2 are covering relaxed level; items 3, 4, 5 are covering slight pressure level; items 6,7,8 are covering moderate pressure level; and items 9, 10, 11 are covering great pressure level. A 4-point Likert scale was specified for this section due to reasons mentioned in Section 3.4.1.2. To label the scale, the researcher decided to label it with words to increase the reliability and to raise satisfaction expressed by the respondents (Dickinson & Zellinger, 1980; Krosnick & Presser, 2010). The used labels are: 1. I don't feel pressure; 2. Feeling some pressure; 3. Feeling pressure; 4. Feeling a lot of pressure. Scale "I don't feel pressure" represents the relaxed pressure level and so on up to the scale "Feeling a lot of pressure" which represents a great pressure level.

Table 25. Part 4 questionnaire design

Dimensions	No	Question	Answer
	To what extent to you agree with the following statement…		4-Likert Scale Response: 1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
Identification, understanding the problem or task	1	It is hard for me to rapidly trace the source codes which makes my program fail to run.	
	2	I fail to figure out the solution for solving the problem to complete the program.	
	3	I able to identify a software bug in the program I'm working on rapidly.	
Preparation, involving learning and remembering	4	I miss the opportunity to keep myself updated with technology for developing the program I'm working on.	
	5	I succeed to remember some essential matters which is needed to complete the program I've created.	
	6	I look for additional perspectives from literatures to perfect the program.	
Response generation, coming up with the ideas	7	Many innovative ideas come up during program creation process.	
	8	I fail to think all possible scenarios to comply with user requirements.	
	9	Working with team mates, I come up with an idea to deminish the mismatch between.	
Response validation and communication	10	I able to evaluate matters that are the weaknesses of the program I'm working on.	
	11	I fail to deliver essential informations concerning the risk factors of the program I'm working on to the interested parties.	
	12	I able to make some interesting observations that help me understand the problem of the program I'm working on when do the testing.	

Table 25 describes 12 items of the questionnaire in part 4 which aimed to get responses to whether the programmers show cognitive characteristics of creativity when working. Such cognitive characteristics are seen from the process of: identification of the problem deeply; preparing the problem solution; generation of new ideas; and validation of the generated idea. Each item relates to one of four cognitive processes. Items 1,2,3 are covering the process of identification; items 4,5,6 are covering the process of solution preparation; items 7,8,9 are covering the process of generating the ideas; and lastly items 10,11,12 are covering the process of validation. As well as part three, part four also specifies using a 4-point Likert scale with word labels as follow: 1. Strongly agree; 2. Agree; 3. Disagree; and 4. Strongly disagree.

8.1.2 The Statistical Analysis

Each scale for each item scores from a range of 1 to 4 points adjusted to the objective of the scale. For example, the scale “I don’t feel pressure” is scored with 1 because 1 in part three means the lowest perceived pressure. Scale “Feeling a lot of pressure” is scored with 4 which means the highest perceived pressure. All items in part three are in the direction of the higher the point, the higher the perceived pressure. In part four, however, the direction is the higher the point, the higher the creativity. However, different to the scoring in part three, in part four the scoring is based on the

item tendency. An item with a positive tendency is an item that shows a positive attitude towards an activity which the programmer is doing while an item with a negative tendency is the other way around An item with a positive tendency, “Strongly agree” is scored 4 and “Strongly disagree” is scored 1 and an item with a negative tendency is scored in the opposite way. An example of an item with a positive tendency is item number 3 whereas the negative tendency can be seen in item number 1.

After scoring, all the responses from each respondent were then summed up for both part three and part four. The total score of each response perceived time pressure responses was correlated to creativity responses by using Pearson Product Moment Correlation statistical analysis in accordance with the results of the parametric test. In order to test the hypotheses, firstly the researcher tested the hypothesis null which is standard in statistical analysis. The testing of H1 and H2 depends on the results of the null hypothesis. When H0 is rejected, then the testing of H1 and H2 will be carried out.

8.1.3 The Result and Discussion

The relationship between time pressure and creativity

The initiating point for any such analysis should thus be the construction and following examination of a scatterplot. Then the type of correlation may be seen by considering, once the independent variable is increased, what will happen to the dependent variable.

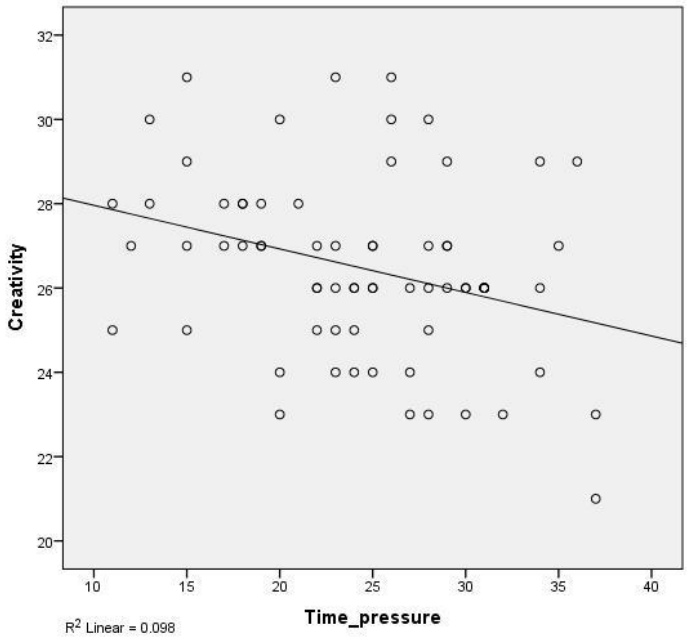


Figure 9. The scatterplot of time pressure and creativity relationship

As seen in Figure 9, the scatterplot suggests a slight relationship between time pressure and creativity. When the time pressure increases, the creativity has a tendency to decrease. There

appears to be a negative correlation between those two variables. It is also noted that there appears to be a linear relationship between them. As can be seen from Figure 9, the regression line shows a slight negative linear line with R^2 = 0.098 which means 9.8% of creativity variability is determined by time pressure.

The result reinforces the Pearson Correlation Coefficient used in this research which is defined as a statistical measure of the strength of a linear relationship between paired data.

Table 26. The correlation of perceived time pressure and creativity using Pearson PMC

Correlations

		Time_pressure	Creativity
Time_pressure	Pearson Correlation	1	-.313**
	Sig. (2-tailed)		.008
	N	70	70
Creativity	Pearson Correlation	-.313**	1
	Sig. (2-tailed)	.008	
	N	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

From the results shown in Table 26, there is a significant relationship with the Pearson correlation value (r= -0.313, N= 70, p < 0.01). Therefore, the researcher rejected the null hypothesis.

Furthermore, there appears to be a negative correlation between two variables which also corresponds to the scatterplot results. Hence, a high level of time pressure is correlated with low creativity. This result precisely supports the hypothesis (H1) that *High time pressure will lead to negative effects for a programmer's creative cognitive processing.* Then, H1 is accepted.

With reference to research carried out by Amabile in 2012, the result is generally similar where the negative relationship is also predicted between time pressure and creativity for some professionals through measuring their activities using a daily questionnaire (r=-0.10, N=177, p<0.01). Despite the fact that the relationship has the same direction, the *r* coefficient value from Amabile's research differs 1 level from this researcher's result. Referring to Evans, in terms of the guidance of the absolute value of *r*, 0.10 is categorised as a very weak relationship while 0.313 is categorised as a weak relationship (Evans, 1996). This may be influenced by the type of creativity processed by the respondents. In her research, Amabile implicated 177 professional from 7 enterprises who were involved in projects requiring creativity. Even though they were required to work creatively, due to their difference professions, there is the possibility that the type of creativity required was different for each profession. Therefore, it is possible that items concerning on creativity asked to the respondents were replied with different perception and resulted in the inter relation among

variables at very week level. Meanwhile, in this research, all 70 respondents worked in the same enterprise or, more precisely, were affiliated to the same enterprise with one profession – programmer. The type of creativity required from all of them can be considered the same or at least not very different. Thus, the creativity statements asked to the programmer A, would be perceived similarly by programmer B and finally resulting to slightly stronger correlation.

According to the typical description of activities programmers do daily, from the four quadrants of creativity (Dietrich, 2004), their type of creativity might be classified in the Quadrant of Thomas Edison which is the type of creativity that tends to act deliberately and cognitively during working in order to find a new idea. This creativity type is owned by a profession that requires specific expertise. In accordance with the characteristics, programming is a profession requiring specific expertise both in terms of soft skills and hard skills. At PLN, soft skills are required by programmers including: communication skills, presentation skills, team work skills, networking, instinct, creativity and innovative thinking. Programmers are required to have good relationships with other parties both external and internal at PLN; at a given due date, they have to present good reports in a direct presentation style to the users and related parties. When the management of PLN hires external consultants to develop or implement certain software, programmers are required to establish cooperation and supervise all activities. And lastly, the instinct skill comes from their experiences in the past; creativity and innovative thinking would support the creation of software. Meanwhile, the skills required by a functional programmer in terms of basic hard skill are programming concepts (OOP, Exception Handling, Algorithm, etc); Common Framework and Protocol (MVC, WebService, Entity Framework, LINQ, Ajax, JSON, etc); Common Library (JQuery, Twitter Bootstrap, etc); Common Library (JQuery, Twitter Bootstrap, agile, etc); Source Control and Versioning Management; and SQL Query, Basic RDBMS Administration.

In conclusion, in carrying out the job items, programmers tend to behave deliberately when associated to soft skill activity and tend to behave cognitive creativity when associated to hard skill activity. The processes above are basically conducted by 2 activities in the brain which are sent by the Pre-Frontal Cortex (PFC): 1. pay focused attention and 2. correlate information that a programmer has stored in other parts of their brain (Dietrich, 2004). Hence, whenever there are instructions related to time restrictions that come from outside, it will destroy the process of creativity.

In the context of programming activities at PLN, from the exploratory interview results, programmers tend to skip the process they consider is not a priority to carry out at that time such as the process of developing new features in software, the process of source code simplification to make memory efficient, the process of program design simplification etc. when there are

interruptions from the management and they give priority to the standard processes as required by the user (Ben Zur & Breznitz, 1981) in order to adjust time completion to the given delivery time.

Taken together from the analysis and theory of previous research, as also proved by the evidence of the coefficient *r* result, it can be concluded that the higher the number of instructions related to the time restriction given by management at PLN, the smaller the opportunity there is for a programmer to generate creativity. Looking at the significant result, it is apparent that time pressure is an important factor in determining creativity but there are other important factors not being accounted for too. Future organisational research, probably including observational research, needs to determine the others factors that influence creativity.

The relationship between each time pressure level and creativity

The second hypothesis (H2) is *Slight pressure is the best time pressure level for a programmer in order to generate creativity.* To test this hypothesis, the researcher needed to know the *r* coefficient for each time pressure level which was the closest to zero. By definition, the closer to zero the less correlation the corresponding time pressure level had to creativity. According to Dietrich (2004), creativity is the process which relates to the amount of time. Hence it is assumed that whenever time pressure is not in a relationship with creativity, it means, at the same time, that there is no relationship to time, or, in other words, the available time is more. A lower correlation implies that the programmer, in carrying out the work, is not affected by time restrictions. When the available time is sufficient, then the process of generating creativity can be achieved (refer to Section 2.2.3). In summary, in the context of working under pressure with a negative correlation, at a time pressure level with the lowest *r* coefficient, then creativity can best be generated.

To know the *r* coefficient for each time pressure level, the researcher then correlated the total responses for each time pressure level to the total responses from all dimensions of creativity.

The correlation results can be seen in the following table:

Table 27. Correlation between each time pressure level and creativity

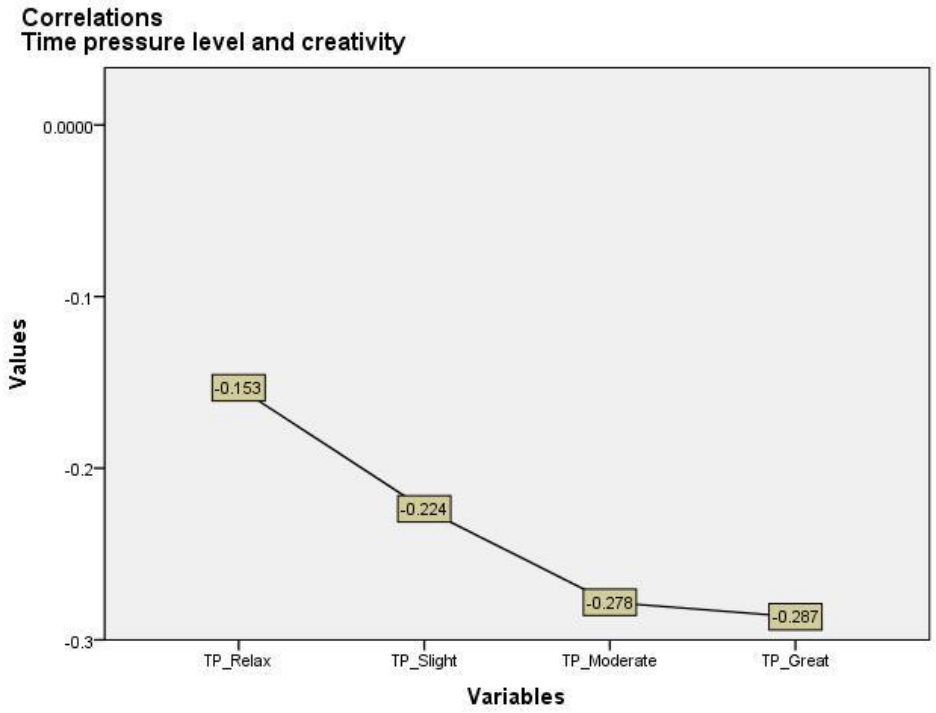
Correlations

		Creativity	TP_Relax	TP_Slight	TP_Moderate	TP_Great
Creativity	Pearson Correlation	1	-.153	-.224	-.278*	-.287*
	Sig. (2-tailed)		.206	.063	.020	.016
	N	70	70	70	70	70

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

presented in graphic, then it can be seen easily which time pressure level has significance to creativity. With 70 samples, there is possibility to have significance insufficient even though the correlation shows a relatively clear relationship. To classify whether it is a strong or weak correlation for 70 samples in this research, one must consider the specific working environment (time pressure given) and psychological motivation (to generate creativity). The standard limit for determining the strength of statistical evaluation for correlation can't be just simply applied directly as also mentioned by Donaldson (2014) (a small sample of points will show a high correlation even if they are completely unrelated); more data is needed to reach significance at a 5% level or less.



Graph 1. The relationship between each time pressure level and creativity

The above Graph describes levels of time pressure with different correlations to creativity from the highest to the lowest level which are: 1. Great, *r* = -0.287, 2. Moderate, *r* = -0.278, 3. Slight, *r* = -0.224, and 4. Relaxed, *r* = -0.153. Despite the fact that the Pearson correlation analysis is not intended to determine the causative relationship, when explicitly considering the correlation value of time pressure from the highest to the lowest and taking into account the negative correlation, the researcher concluded that time pressure and creativity may have a causative relation where the higher time pressure level has a stronger negative correlation with creativity and so on. This can also be seen from the significant value, whereas the great pressure level contributes 1.6% to the correlation followed by 2%, 6.3% and 20.6% for the moderate, slight and relaxed levels respectively.

To test hypothesis (H2) that *Slight pressure is the best time pressure level for a programmer in order to generate creativity,* time pressure level with *r* coefficient close to zero can be assumed as the best level to generate creativity. From Graph 1 it can be seen that the lowest or closest to zero value for the *r* coefficient is at a relaxed pressure level. Relaxed pressure may seem to be insignificant for a value that is far greater than 5% even though the *r* coefficient is the lowest. This may also imply that the relaxed situation is not considered to be a factor influencing creativity. Therefore, this pressure level can't be concluded to be the best level to generate creativity. The second lowest *r* coefficient is a slight pressure level with a significance value of 6.3% or there is weak evidence against H0, yet this level is the level which can most likely be generalised as the least negative effect on creativity. This condition may be due to programmers having very low time restrictions. Thus, programmers have more time to process creativity compared to pressure levels with an *r* coefficient above slight pressure. For this assumption, H2 is accepted.

Interestingly, based on the conclusion above that the *r* coefficient for slight pressure is the lowest with significance close to the standard limit or assumed as the lowest time pressure, then this would agree with the operational definition of slight pressure itself obtained from the preliminary study in which respondents were more or less similar to respondents involved in stage 2 of this survey. Slight pressure is defined as a condition in which a programmer accepts one task with the possibility of having pressure in instructions from management only once. This finding also precisely confirmed the results in the preliminary study as valid because, when the respondents were asked for the same context of problems, then their responses were consistent.

Another interesting thing is the finding in Chapter 6; the maximum time pressure level a programmer considered to acceptable to complete the job excellently was a slight pressure level. To complete the job excellently is defined as completing the job not only at the standard required but also beyond the expectations of the job owner. In the context of creativity, this means there are new things to be added to the final result of the job or, in other words, there are creative processes involved. If analysed further, this condition is the maximum condition perceived by the user for them to generate creativity. This statement basically refers to H2 which is the best time pressure level to generate creativity. Therefore, it can be concluded that the maximum time pressure level a programmer considered acceptable to complete a job excellently is equivalent to the best time pressure level for a programmer to generate creativity.

By way of example, when the management asked programmers to create a program with 5 reporting features, and for the final job, the programmer added 3 additional reports to support and simplify the user task, even though they have not been asked, the results of brainstorming and the business process from the initial application construction, may result in the programmer capturing

other needs which are not delivered by the user. In these circumstances, when a programmer is given sufficient time at the development stage then these 3 additional reports result from the creative thinking process of a programmer.

The relationship between time pressure levels and each dimension of creativity

For more colour in the results of this research, the researcher presents a more specific correlation between each time pressure level with each dimension of creativity. From this correlation result, it is expected that a new perspective will be offered to scholars in terms of there being levels of correlation which are different between time pressure and each dimension of creative cognitive processing. **More detailed discussion on the results of each dimension of creative cognitive processing will not be presented in this research.** This could be a potential area for further research.

1. The Time Pressure and each dimension of creativity

Table 28. The relationship between time pressure and each dimension of creativity

Correlations

		Time_pressure	CR_Identifitaction	CR_Preparation	CR_Generation	CR_Validation
Time_pressure	Pearson Correlation	1	-.268*	.045	-.305*	-.081
	Sig. (2-tailed)		.025	.714	.010	.503
	N	70	70	70	70	70

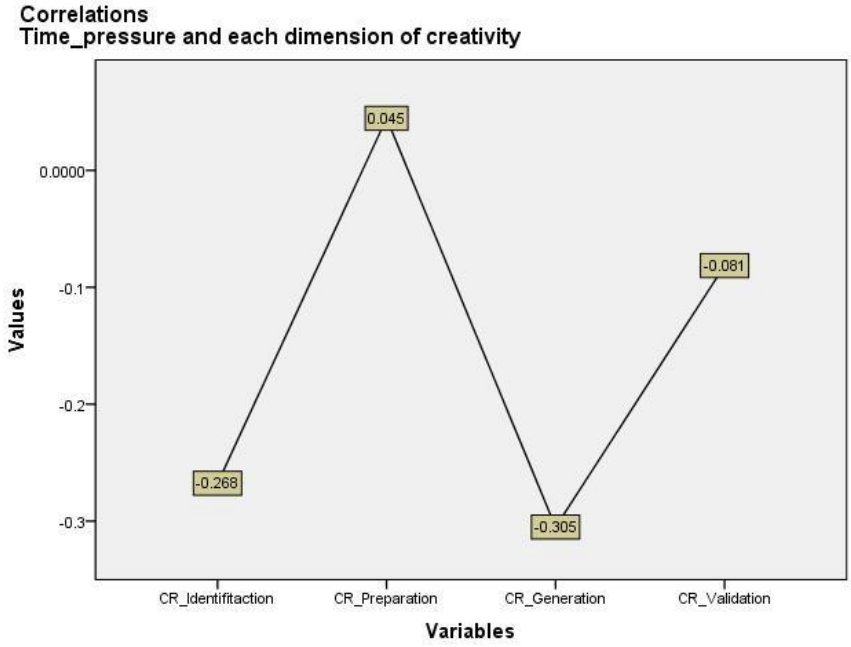
*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 28 explains the relationship between time pressure and each dimension of creativity. From the table it can be explained:

1. Time pressure and the generation dimension have the highest negative correlation with r coefficient = -0.305, $p < 0.05$
2. Time pressure and the identification dimension have the second highest negative correlation with *r* coefficient = -0.268, $p < 0.05$
3. Time pressure and the validation dimension have the lowest negative correlation with *r* coefficient = -0.081, and there is weak evidence against the null hypothesis $p = 0.503$
4. Time pressure and the preparation dimension, in contrast, have an *r* coefficient of 0.045 with a significance level far beyond 5% which can be said to offer no evidence against H0. Because the correlation is close to zero with a significance level $p = 0.714$, it can be concluded that there is insufficient evidence to declare that time pressure and preparation dimension have a correlation.

For more explicit illustration of this point, the above correlation can be seen in the following Graph.



Graph 2. The relationship between time pressure and each dimension of creativity

2. Relaxed pressure and each dimension of creativity

Table 29. The relationship between relaxed pressure and each dimension of creativity

Correlations

		CR_Identifitaction	CR_Preparation	CR_Generation	CR_Validation	TP_Relax
TP_Relax	Pearson Correlation	-.160	-.183	.191	-.229	1
	Sig. (2-tailed)	.185	.130	.113	.056	
	N	70	70	70	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

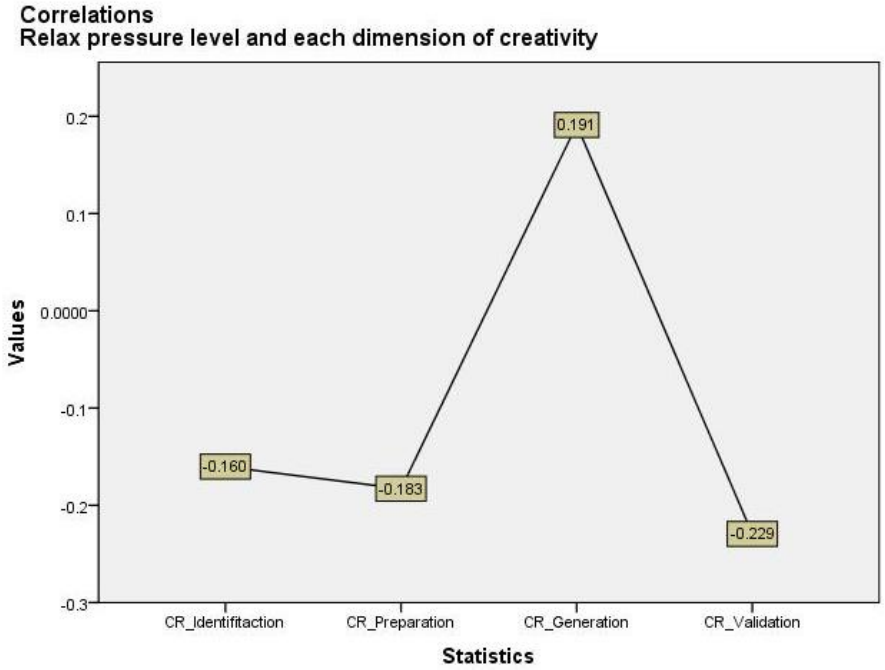
Referring to Graph 2, the relaxed level is the time pressure level with the lowest negative *r* coefficient or it almost has no correlation with creativity. This is clarified in the detailed correlation between relaxed pressure and each dimension of creativity.

1. Relaxed pressure has a significant negative relationship only in the validation dimension with an *r* coefficient = -0.229. With p = 5.6%, it can be concluded there is weak evidence against H0.
2. In the identification and preparation dimension, even though there is a negative correlation with relaxed pressure, -0.16 and -0.18 respectively, however, there is no evidence against H0, p = 18.5% and p = 13% respectively. Therefore, there is insufficient evidence to state

that time pressure and both the identification and preparation dimensions have a correlation.

3. Meanwhile in the generation dimension, an insignificant positive correlation with relaxed pressure has been found, *r* coefficient = 0.191, p =11.3%.

For more explicit information, the above correlation can be seen in the following graph.



Graph 3. The relationship between relaxed pressure and each dimension of creativity

3. Slight pressure and each dimension of creativity

Table 30. The relationship between slight pressure and each dimension of creativity

Correlations

		CR_Identifitaction	CR_Preparation	CR_Generation	CR_Validation	TP_Slight
TP_Slight	Pearson Correlation	-.221	.039	-.142	-.118	1
	Sig. (2-tailed)	.066	.747	.241	.329	
	N	70	70	70	70	70

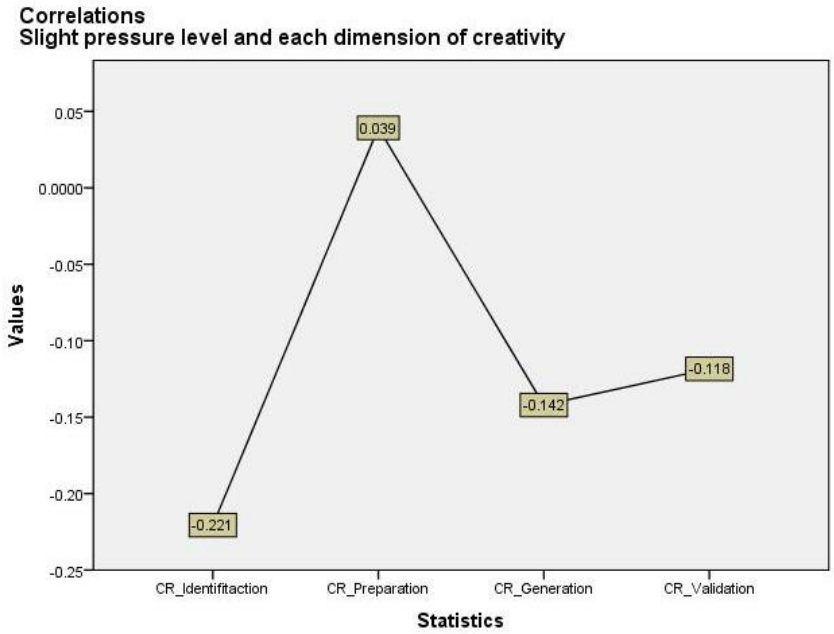
**. Correlation is significant at the 0.01 level (2-tailed).

From Table 30 it can be explained:

1. Slight pressure has a negative correlation with the identification dimension r = -0.221 and there is weak evidence to reject H0.
2. For the other three dimensions which are preparation, generation and validation, even though a correlation with the r coefficient is found, 0.039, -0.142 and – 0.118 respectively, however, there is no evidence to reject H0 or, in other words, there is insufficient evidence

to say that slight pressure has a correlation with the dimensions of preparation, generation and validation.

For more explicit information, the above correlation can be seen in the following graph.



Graph 4. The relationship between slight pressure and each dimension of creativity

4. Moderate pressure and each dimension of creativity

Table 31. The relationship between moderate pressure and each dimension of creativity

Correlations

		CR_Identifitaction	CR_Preparation	CR_Generation	CR_Validation	TP_Moderate
TP_Moderate	Pearson Correlation	-.237*	.063	-.348**	.011	1
	Sig. (2-tailed)	.048	.602	.003	.930	
	N	70	70	70	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

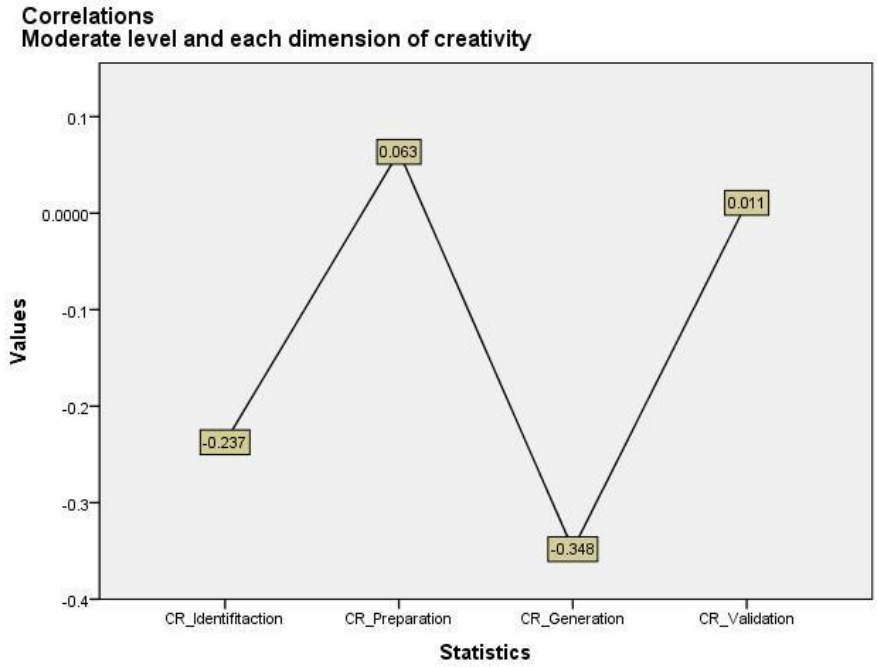
*. Correlation is significant at the 0.05 level (2-tailed).

From the Table 31 the following can be described:

1. The relationship between moderate pressure and the generation dimension is seen to have a negative significant correlation with the highest r coefficient compared with other dimensions of creativity ($r = -0.348$, $p < 0.05$).
2. The second highest negative significant correlation relationship is seen in the relationship between moderate pressure and the identification dimension ($r = 0.237$, $p < 0.05$).

3. Meanwhile, in the other two dimensions, correlation is seen as very low or even non-existent because the r coefficient is close to 0 at 0.063 and 0.011 for the dimensions preparation and validation respectively. Furthermore, there is no evidence against H0. Hence there is no evidence to conclude that moderate pressure is correlated with the dimensions of preparation and validation.

For more explicit information, the above correlation can be seen in the following graph.



Graph 5. The relationship between moderate pressure and each dimension of creativity

5. Great pressure and each dimension of creativity

Table 32. The relationship between great pressure and each dimension of creativity

Correlations

		CR_Identifitaction	CR_Preparation	CR_Generation	CR_Validation	TP_Great
TP_Great	Pearson Correlation	-.213	.077	-.374**	-.042	1
	Sig. (2-tailed)	.077	.526	.001	.730	
	N	70	70	70	70	70

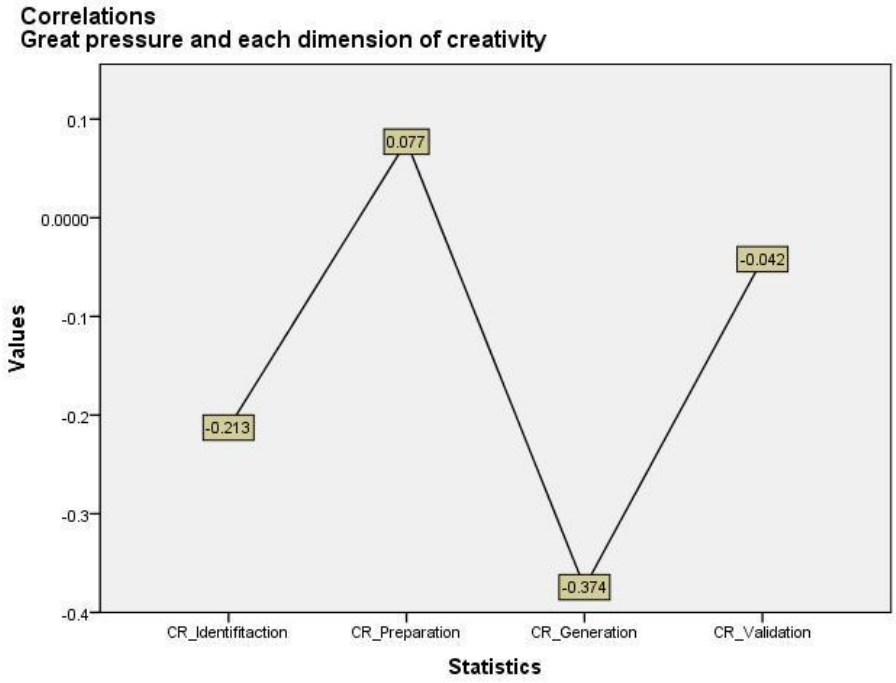
**. Correlation is significant at the 0.01 level (2-tailed).

From the above Table it can be concluded that:

1. For the relationship between great pressure and the generation dimension there is negative significant correlation with the r coefficient = -0.374, $p < 0.05$.

2. Meanwhile for the relationship between moderate pressure and the identification dimension there is a negative correlation *r* = -0.213 but there is weak evidence to reject H0, p = 0.077.
3. Meanwhile for the other two dimensions, the correlation is very low or even non-existent because the r coefficient is close to 0 which gives 0.077 and 0.042 for the dimensions of preparation and validation respectively. Furthermore, there is no evidence against H0. Hence there is no evidence to conclude that moderate pressure is correlated with the dimension of preparation and validation.

For more explicit information, the above correlation can be seen in the following graph.



Graph 6. The relationship between great pressure and each dimension of creativity

Chapter 9. Conclusion and Recommendations

9.1 Conclusion

Time pressure has been shown to be associated with positive and negative implications both for the organisation and employees themselves. These research findings have significant implications for both sides at once. The characteristics of Indonesian respondents working for a government company are considered to present distinct results compared to most previous research findings.

1. This research confirms there is a significant relationship between perceived time pressure and creativity of programmers with a negative direction. This means the more instructions related to time restrictions given by management, the smaller the opportunity a programmer has to generate creativity.
2. In slight pressure conditions, programmers are believed to be able to generate more creative software than in other pressure conditions.
3. Over the preliminary study, this research identified four perceived time pressure levels: relaxed; slight pressure; moderate pressure; and great pressure; each of them was determined by the task quantity and the possibility of receiving pressure on a related day.
4. The median value of time pressure amount perceived by programmers were: relaxed pressure 38%, slight pressure 40%, moderate pressure 45% and great pressure 42%.
5. 41% of programmers believed they are able to perform best at a slight pressure level.
6. Young programmers, aged between 24 and 30 years old, tended to search for other triggers rather than just simple relaxed situations to be very well motivated to excellently complete a job or to achieve work satisfaction.
7. Time pressure is required at a higher level other than the relaxed level up to the slight pressure level before it starts to induce dissatisfaction amongst programmers.
8. Time pressure improves work productivity even at the highest level of time pressure though work quality, at a certain level, becomes poorer.
9. There is no tendency for higher time pressure to lead to higher employee turnover. The loyalty of employees characteristic is dependent on the benefits and security offered by the company.

Restriction of resources for research naturally generates limitations, and this research is no exception. Due to the fact that it was carried out at PLN, the limited total number of programmers as target respondents is considered to have restricted the result. The purposive sampling method used in this research relating to the interpretation of results is thus limited only to PLN and its subsidiaries and also to other companies with similar characteristics.

9.2 Recommendations

9.2.1 Recommendation for researchers and companies in general.

For the researcher, since this research was carried out in one specific workplace, to generate a more profound result, developing future research in other organisations, probably in various industries, could be considered necessary. A depth analysis of time pressure related to job characteristics and professions would also contribute to knowledge in a similar research field concerning the significant and valid factors that affect creativity. Lastly, the more research about perceived time pressure level classification for other professions, the more generalisation would be possible and the stronger the findings of this research which could be applied to other time pressure research also in other organisations.

For the company, to achieve benefits from time pressure in terms of increasing employee performance, job quality, and a company product as the outcome of a programmer's creativity, the management should apply time pressure at an appropriate level as a form of control and support employees' competitiveness and eagerness. The appropriate level of time pressure in each company may be implemented differently from these research findings according to management interest. However, management should realise that placing an excessive amount of pressure will negatively affect the original purposes. Moreover, management is also recommended to regularly control current time pressure conditions to avoid the adverse effects of time pressure. The best controlling approach is to combine different measures targeting work-related and employee-related issues. It is necessary to tailor the measures to the specific situations in each company division or specific workplaces such as:

1. Measuring a programmer's daily working hours in relation to the tasks they are responsible for.
2. Limiting excessive overtime adjusted to official employee working hours.
3. Improving the job description.
4. Improving working condition, for instance by reorganising the software engineering team based on individual expertise, software engineering team methodology i.e. agile team, scrum team, which respect to management interests.
5. Adjusting the project schedule.
6. Improving the way the work is organised, intensify the cooperation within a department, and also the management structure.
7. Improving internal communication by raising the subject of work pressure and anything related to department interest to team meeting, internal division meeting, or department level meeting and during other discussions between programmers and management.

8. And the most important issue is that management should always keep in mind some points: Are programmers able to handle the amount of work within the given delivery time? Does the outcome from the programmers satisfy management expectations? In terms of having a conducive and pleasant workplace, management should ensure that the answer to those questions is yes.

9.2.2 Recommendations for PLN

PLN, as an Indonesian government enterprise, has robust credibility to attract the loyal employee. With highly secured social security, employees tend to remain no matter what the conditions even in a high pressure atmosphere. The employee turnover rate shows an incredibly low rate at only 0.22% and 0.30% for 2016 and 2017 respectively meaning that PLN has an opportunity to continue to grow without fear of losing potential employees. Despite the strong position, however, PLN should not ignore any sign which indicates decreased employee performance which affects the quality of a product. In the STI Division, where this research took place, the kind of sign has slightly surfaced as seen from the perceived experiences of programmers related to workload conditions and time pressure. Referring to these research findings, programmers in PLN perceive they are working in quite a high-pressure workplace which affects their productivity, quality of the software and also their creativity. Looking at the nature of the culture of PLN and, in particular, the STI Division and the work pressure problems that have been identified, management is advised to regularly evaluate and control employee performance and the outcomes themselves. Lastly, in general, the management of PLN must be aware that giving excessive amounts of pressure to the programmers does not lead to resignation but has a greater effect on the product they deliver.

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Appendix A

R Value Pearson Product Moment Correlation

N	Taraf Signifikan		N	Taraf Signifikan		N	Taraf Signifikan	
	5%	1%		5%	1%		5%	1%
3	0.997	0.999	26	0.388	0.496	55	0.266	0.345
4	0.950	0.990	27	0.381	0.487	60	0.254	0.330
5	0.878	0.959	28	0.374	0.478	65	0.244	0.317
6	0.811	0.917	29	0.367	0.470	70	0.235	0.306
7	0.754	0.874	30	0.361	0.463	75	0.227	0.296
8	0.707	0.834	31	0.355	0.456	80	0.220	0.286
9	0.666	0.798	32	0.349	0.449	85	0.213	0.278
10	0.632	0.765	33	0.344	0.442	90	0.207	0.270
11	0.602	0.735	34	0.339	0.436	95	0.202	0.263
12	0.576	0.708	35	0.334	0.430	100	0.194	0.256
13	0.553	0.684	36	0.329	0.424	125	0.176	0.230
14	0.532	0.661	37	0.325	0.418	150	0.159	0.210
15	0.514	0.641	38	0.320	0.413	175	0.148	0.194
16	0.497	0.623	39	0.316	0.408	200	0.138	0.181
17	0.482	0.606	40	0.312	0.403	300	0.113	0.148
18	0.463	0.590	41	0.308	0.398	400	0.098	0.128
19	0.456	0.575	42	0.304	0.393	500	0.088	0.115
20	0.444	0.561	43	0.301	0.389	600	0.080	0.105
21	0.433	0.549	44	0.297	0.384	700	0.074	0.097
22	0.423	0.537	45	0.294	0.380	800	0.070	0.091
23	0.413	0.526	46	0.291	0.376	900	0.065	0.086
24	0.404	0.515	47	0.288	0.372	1000	0.062	0.081
25	0.396	0.505	48	0.284	0.368			
			49	0.281	0.364			
			50	0.279	0.361			

Appendix B

Critical value Kolmogorov - Smirnov

n	α = 0,20	α = 0,10	α = 0,05	α = 0,02	α = 0,01
1	0,900	0,950	0,975	0,990	0,995
2	0,684	0,776	0,842	0,900	0,929
3	0,565	0,636	0,708	0,785	0,829
4	0,493	0,565	0,624	0,689	0,734
5	0,447	0,509	0,563	0,627	0,669
6	0,410	0,468	0,519	0,577	0,617
7	0,381	0,436	0,483	0,538	0,576
8	0,359	0,410	0,454	0,507	0,542
9	0,339	0,387	0,430	0,480	0,513
10	0,323	0,369	0,409	0,457	0,486
11	0,308	0,352	0,391	0,437	0,468
12	0,296	0,338	0,375	0,419	0,449
13	0,285	0,325	0,361	0,404	0,432
14	0,275	0,314	0,349	0,390	0,418
15	0,266	0,304	0,338	0,377	0,404
16	0,258	0,295	0,327	0,366	0,392
17	0,250	0,286	0,318	0,355	0,381
18	0,244	0,279	0,309	0,346	0,371
19	0,237	0,271	0,301	0,337	0,361
20	0,232	0,265	0,294	0,329	0,352
21	0,226	0,259	0,287	0,321	0,344
22	0,221	0,253	0,281	0,314	0,337
23	0,216	0,247	0,275	0,307	0,330
24	0,212	0,242	0,269	0,301	0,323
25	0,208	0,238	0,264	0,295	0,317
26	0,204	0,233	0,259	0,290	0,311
27	0,200	0,229	0,254	0,284	0,305
28	0,197	0,225	0,250	0,279	0,300
29	0,193	0,221	0,246	0,275	0,295
30	0,190	0,218	0,242	0,270	0,290
35	0,177	0,202	0,224	0,251	0,269
40	0,165	0,189	0,210	0,235	0,252
45	0,156	0,179	0,198	0,222	0,238
50	0,148	0,170	0,188	0,211	0,226
55	0,142	0,162	0,180	0,201	0,216
60	0,136	0,155	0,172	0,193	0,207
65	0,131	0,149	0,166	0,185	0,199
70	0,126	0,144	0,160	0,179	0,192
75	0,122	0,139	0,154	0,173	0,185
80	0,118	0,135	0,150	0,167	0,179
85	0,114	0,131	0,145	0,162	0,174
90	0,111	0,127	0,141	0,158	0,169
95	0,108	0,124	0,137	0,154	0,165
100	0,106	0,121	0,134	0,150	0,161