

Technology Development and Technology Management

Explaining Knowledge Creation Using Structuration Theory

Ikbal Maulana

Center for Science and Technology Development Studies (PAPPIPTEK)-LIPI, Indonesia

Abstract

Knowledge creation is a social process within which both knowledgeable agents and social structure play significant roles. Nonaka and Takeuchi, and the former with other co-writers, have proposed the theory to explain this process in which tacit and explicit knowledge are transferred and converted through the processes of socialization, externalization, combination, and internalization (SECI model). These processes occur under certain organizational context, which they calls 'ba'.

Nonaka and Takeuchi did not construct their theory based on structuration theory, however, the latter must also be able to explain knowledge creation, because knowledge creation is a social process in which people interact with each other to exchange knowledge and ideas.

By using two theories to explain the same phenomena, we can reveal aspects, which are hidden if only one theory is used. Whether the results are in conflict or complement each other, this enterprise will allow us to enrich each theory we use. The possible contribution to structuration theory is as follow. After analyzing the case study, we propose that knowledge should be explicitly included in the resources, in addition to allocate and authoritative resources. Moreover, to knowledge creation theory, the concept of 'ba' can be replaced by structure, because structure consists of more detailed social dimensions that may affect knowledge creation. However, knowledge should be included as part of the structure.

Keywords: knowledge creation, structuration theory, SECI, knowledge-based view

1. Introduction

The development of the theory of resource-based view (RBV) of the firm has ultimately revealed that, more than anything else, knowledge is the main and lasting source of competitive advantage (Hamel & Prahalad, 1994; Prahalad & Hamel, 1990). Knowledge development in a firm determines its competitive advantage more than its position to other Porter's (1980) five forces does. Therefore, the logical next step of RBV is knowledge-based view of the firm. Some authors (such as Nonaka, 1994; Nonaka & Takeuchi, 1995; and Nonaka with other co-writers) have developed and refined the theory of knowledge creating company, because they believe that the capability of knowledge creation is the ultimate and lasting source of competitive advantage; while the others (Tece et al, 1997) call their theory dynamic capability, which also refer to knowledge, because capability is the manifestation of knowledge.

As the awareness of knowledge as a source of competitive advantage grows, academics as well as practitioners have worked to find a way to understand how knowledge in a firm grows. Far before knowledge was realized as a source of

competitive advantage in business, people have realized the importance of knowledge. Many great civilizations anywhere in the world have emphasized the importance of education. After Descartes' pioneering work in modern philosophy, epistemology (knowledge of knowledge) has been the importance branch of philosophy for centuries until today. However, knowledge is always seen as something very complex, and as the important part of the self of any individual, so, it is beyond something that can be managed. Therefore knowledge management can be seen as too ambitious enterprise, or is even mission impossible.

In contrast to the above view of knowledge, the mainstream neoclassical economists develop their field based upon very simplified view of knowledge, they "... were concerned with the utilization of existing knowledge, which is represented by price information. Under market mechanism, every firm has the same fixed knowledge that enables profit maximization, rather than having different knowledge created by each firm (Nonaka & Takeuchi, 1995). However, the Austrian school of economics, represented by Hayek and Schumpeter, acknowledges knowledge as subjective and changing, and the

growth of knowledge causes the economy always in changing. The role of knowledge at firm level is discussed thoroughly for the first time by Edith T. Penrose (1959). She viewed the firm as “both an administrative organization and a collection of productive resources, both human and material” (p. 31). However, resources themselves are just input for production processes, therefore cannot be sources of competitive advantages. Services rendered from resources are those that create value and a function of the experience and knowledge accumulated within a firm. In the beginning, Penrose’s work did not get enough attention, because its perspective regarding firm so diverted from that of the mainstream. However, as time went by, Penrose’s perspective attracted more and more people, and inspired the birth of RBV and evolutionary economics (Nelson & Winter, 1982).

As the world economy becomes more turbulent and technology changes more rapidly, the need to grow to grow knowledge is further emphasized by Peter Drucker in his book, *Post-Capitalist Society* (1993). This need triggers the development of the theory of organizational learning or of the theory of knowledge creation. More detailed investigations into the definitions and classifications of knowledge and that of learning were pursued by a number of leading scholars, such as Argyris and Schon (1978), Senge (1990), and Nonaka and Takeuchi (1995). The work of Nonaka and Takeuchi is now the most influential in the field of knowledge management.

In the context of this paper, it is only called knowledge if it can be used to solve the problem of a firm or individual or to do something that benefits a firm or individual. Often the problems in a firm cannot be solved by the knowledge of individual, but required knowledge possessed by individuals dispersed in units, across units, and sometimes across the boundary of a firm. This problem was identified by Hayek (1945):

“The peculiar character of the problems of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must never exist in concentrated or integrated form,

but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate “given” resources... it is a problem of the utilization of knowledge not given to anyone in its totality.” (p. 519-520).

Another problem, which must be added to problem mentioned by Hayek, is that often the knowledge is not readily available. They need to learn collectively, by first exploring the problem, developing shared vision of solution, developing knowledge individually and combined each other’s knowledge to deliver single solution. This process depends on the peculiar character of the social dynamics and set of existing knowledge of the people within the firm. Therefore, different firm may develop different competency or solution.

Nonaka and Takeuchi (1995) have come up with their model of knowledge creation, which is further refined in, for example, Nonaka et al. (2000), Nonaka and Toyama (2005), and Nonaka and Peltokorpi (2006). Their model has become the dominant model in explaining how knowledge is transferred, combined, and created.

This paper provides alternative explanation of knowledge creation based on structuration theory. In the following section it will be explained why structuration theory that is more general than Nonaka and Takeuchi’s theory is proposed, and what benefits we will get by employing this theory.

2. Why We Need Another Theory?

When we need to propose alternative theory? The knowledge creation has been explained very well by Nonaka and his co-writers, so why do we still need another theory? According to Kuhn:

“There are, in principle, only three types of phenomena about which a new theory might be developed. The first consists of phenomena already well explained by existing paradigms, and these seldom provide either motive or point of departure for theory construction. When they do... the theories that result are seldom accepted, because nature provides

no ground for discrimination. A second class of phenomena consists of those whose nature is indicated by existing paradigms but whose details can be understood only through further theory articulation. These are the phenomena to which scientists direct their research much of the time, but that research aims at the articulation of the existing paradigms rather than at the invention of new ones. Only when these attempts at articulation fail do scientists encounter the third type of phenomena, the recognized anomalies whose characteristic feature is their stubborn refusal to be assimilated to existing paradigms. This type alone gives rise to new theories. Paradigms provide all phenomena except anomalies with a theory-determined place in the scientist's field of vision" (Kuhn, 1987, p. 268).

The phenomenon of knowledge creation has been explained by Nonaka and Takeuchi (1995). This phenomenon occurs in social structure, and conducts by individuals involved within it. Therefore, it is also the type of phenomena that can be explained by structuration theory (Giddens, 1984). However, do we need to devise explanation based of structuration theory when Nonaka and Takeuchi have already well explained it? Or, can Giddens' theory gives more detailed explanation while it is actually more general theory than that of Nonaka and Takeuchi?

The writer has another motive. Every theory gives us different perspective or focus on or highlights certain aspects of phenomena. In multidisciplinary fields, such as knowledge management, often the phenomena are approached from different perspectives, such as sociology of knowledge, industrial sociology, or management science. Different perspectives may compete against each other, or even complement each other because they reveal different aspects of the phenomena. The latter allow us to synthesize a new richer theory since we can combine the strength of each approach.

By explaining knowledge creation using structuration theory, we may see different aspects of this phenomenon, and maybe come up with another richer explanation of it. Therefore, the purpose of this enterprise is not to replace Nonaka and Takeuchi's theory, but to explore the possibility to enrich it using

structuration theory.

3. Nonaka and Takeuchi's Theory of Knowledge Creation

Before proposing our structuration theory of knowledge creation, the Nonaka and Takeuchi's theory will be briefly summarized here. They proposed it in opposition with dominating Western view of knowledge that separates subject from object, or the knower from the known. The Western positivistic view regarded organization as an information processing mechanism, "According to this view, an organization processes information from the external environment in order to adapt to new circumstances." (Nonaka & Takeuchi, 1995). It, however, does not explain innovation, because, "When organizations innovate, they do not simply process information, from the outside in, in order to solve existing problems and adapt to a changing environment. They actually create new knowledge and information, from the inside out, in order to redefine both problems and solutions and, in the process, to re-create their environment." (p. 56).

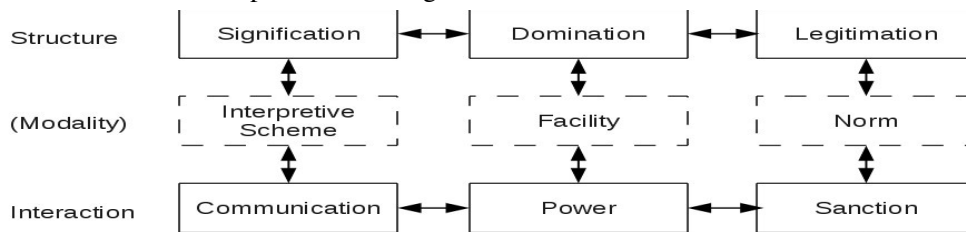
The theory of knowledge creation relies on the assumption that knowledge is context-specific, relational, dynamic, and humanistic, related to human action (Nonaka et al., 2000). Context-specific means that knowledge is embedded in certain social relationship; in the firm context, it is developed in certain social and work setting. Two dialectical relations occur in knowledge creation: one between inner and outer dialectics, and the other between thought and action (Nonaka & Peltokorpi, 2006). The former dialectics refer to "the human inner (processes internal to individual) and outer (interactions between the individual and the external world) dialectics can instead be assumed to have an impact on the surrounding reality, which is why organizations do not always live up to their rational promise." (p. 89).

The theory of knowledge creation is a departure from neoclassical economics, which views that a firm has the ability to maximize its profit based on perfect rationality. Neoclassical view does not consider information asymmetry. Any economic player has the same knowledge of anything. Separated theoretical developments have

countered the neoclassical view, especially those that have assumption that economic actors having bounded rationality instead of perfect rationality (Simon, 1945).

In the theory of organizational knowledge creation, individuals play significant roles because knowledge creations occur in the head of individuals. However, it does not exclude the role of organization, which provide a place ('ba') or context to individuals' thinking. Organization is not just a place for individuals to combine knowledge they already have. But, collectively, they develop their knowledge so that each of them develop knowledge in relation to their colleagues' knowledge. The longer or the more complex the task they have to do, the more dependent each one's knowledge to that of the others, so that individual can transcend her own boundary (Nonaka et al., 2000).

Knowledge creation occurs through the dialectics of tacit and explicit knowledge



Source: Giddens (1984).

Figure 1. Dimensions of the Duality of Structure

which take place in the (socialization, externalization, combination and internalization (SECI) processes (Nonaka & Takeuchi, 1995). According to Polanyi (1962) knowledge always consists of tacit and explicit parts. Tacit knowledge is knowledge, which is hard to explain or to externalize. Having tacit knowledge we know more than we can tell. While explicit knowledge can be transferred in spoken or writing, tacit knowledge cannot be readily transferred. We can learn others' tacit knowledge through direct interactions, just like the interaction between apprentice and master. We work under the supervision of the master, and get direct feedback or guidance from him. Nonaka and Peltokorpi (2006) accept the explanation the development of tacit and explicit knowledge based on structuration theory:

“Humans perform daily actions through practical and discursive consciousness. Where the former refers to tacit stock of knowledge from which humans unconsciously embrace environment, the latter describes conscious levels of knowing. Like tacit knowledge, practical consciousness reflects humans' being inside of the external world.” (p. 91-92).

During the externalization process, we can tell our tacit knowledge through metaphors, dialogues, analogies, and models. Here, words and logics are not used strictly. Active listening and openness are needed because spoken expressions are just an approach to tacit knowledge, not tacit the knowledge itself. To make the externalization of tacit knowledge more accessible to others organizations systematize, validate, and crystallize it “... in more explicit forms for collective awareness and practical usage” (p. 92).

Knowledge creation occurs through the SECI processes within certain context ('ba'). For a large organization, units within which have different context, and as people come and go across organizational units, or, even come and go out of the organization, combination of SECI processes and context may create dispersed knowledge, which could only be understood by the people creating it. The purpose of knowledge management is to make organization can access all the knowledge created within it at any time. Accessing knowledge does not have to be putting in in writing or database, but it includes having the capability to identify people who possess it, so that organization can command them to do jobs requiring the knowledge, or let other people know about them.

4. Structuration Theory of Knowledge Creation

Even though Nonaka and Takeuchi's (1995) knowledge creation was not derived from structuration theory, the former is not totally separated from the latter. That the theory of knowledge creation is in line with structuration theory has been indicated by Nonaka et al. (2000) themselves who suggest that, "Without understanding the nature of human beings and the complex nature of human interactions, we cannot understand the theory of organizational knowledge creation." Further, Nonaka and Peltokorpi (2006, 89) assert, "The time-space specific interactions in knowledge-creation are dialectical because the actors influence, and are influenced by, their surrounding reality." This is in line with the duality of structure according to Giddens (1984):

"The constitution of agents and structures are not two independently given sets of phenomena, a dualism, but represent a duality. According to the notion of the duality of structure, the structural properties of social systems are both medium and outcome of the practices they recursively organize... Structure is not to be equated with constraint but is always both constraining and enabling."

In Nonaka and Takeuchi (1995), Giddens' structuration theory is not mentioned, but in Nonaka and Peltokorpi (2006), structuration theory is mentioned, even though not so apparent compared to phenomenological perspective of knowledge. However, phenomenology has significant influence on both Giddens (1984) and Nonaka and Takeuchi (1995).

To derive explanation of knowledge creation based on structuration theory, I will identify the parallel of the concepts used in structuration theory and Nonaka and Takeuchi's (1995) knowledge creation theory.

The main elements of structuration theory are human agent and structure. Agent and structure are closely interrelated, or influence each other. Even though, Giddens does not specifically intend to use structuration theory to explain the innovation or knowledge creation, he emphasizes the role of knowledgeable agents who continuously develops his or her knowledge in order to create or recreate structure. As Giddens states,

"It is the specifically reflexive form of knowledgeable ability of human agents that is most deeply involved in the recursive ordering of social practices." (p. 3).

Structure in structuration theory is not used as in classical organizational science, which depicts it as interrelated function of an entity. It may be defined as the rules and resources recursively implicated in the reproduction of social systems (Giddens, 1984). The recursiveness implies that structure is both a product of and the basis for the interactions of agents. As the basis for the interaction, structure creates context for agents' interaction, so it accommodates the concept of 'ba'. Agents' interactions (communication, power, and sanction), as shown in Figure 1, are transformed into structure (signification, domination, and legitimating) by way of modalities (interpretive schemes, facilities, and norms) and vice versa (Giddens, 1984).

While tacit knowledge (Polanyi, 1964) has the fundamental position in Nonaka and Takeuchi (1995), Giddens has not quoted anything from Polanyi, although he mentions that, "Most of rules implicated in the production and reproduction of social practices are only tacitly grasped by actors..." (Giddens, 1995). Therefore, he acknowledges that most of our knowledge regarding social practices is tacit knowledge. But, we can also find what can be identified as tacit and explicit knowledge in Giddens' work, that are discursive and practical consciousness. According to Giddens, "Between discursive and practical consciousness there is no bar; there are only differences between what can be said and what is characteristically simply done." (p. 7). That the larger part of individual's knowledge regarding social rule is tacit is acknowledged by Giddens as he says, "... that awareness of social rules, expressed first and foremost in practical consciousness, is the very core of that 'knowledgeability', which specifically characterizes human agents. As social actors, all human beings are highly 'learned' in respect of knowledge which they possess, and apply, in the production and reproduction of day-to-day social encounters; the vast bulk of such knowledge is practical rather than theoretical in character." (p. 21-22).

The conversion of knowledge can be

found in Giddens' work, even though not as detailed as that in Nonaka and Takeuchi's (1995) SECI model, "I do not intend the distinction between discursive and practical consciousness to be rigid and impermeable one. On the contrary, the division between the two can be altered by many aspects of the agent's socialization and learning experiences." (p. 7). And, in the case of knowledge creation, the development of structure itself can also be understood as the development of knowledge, because structure is recursively organized sets of rules and resources through the interaction of knowledgeable agents. Giddens asserts:

"According to the notion of the duality of structure, the structural properties of social systems are both medium and outcome of the practices they recursively organize. Structure is not 'external' to individuals: as memory traces, and is instantiated in social practices, it is in a certain sense more 'internal' than exterior to their activities in Durkheimian sense. Structure is not to be equated with constraint, but is always both constraining

schemes or standardized stocks of knowledge or references to communicate the reality of their actions in the production of interaction. Specifically, signification comprises rules, procedures, and techniques to produce meanings to which agents refer via interpretative schemes when they communicate." (p. 279).

Prior to the development of Prius, the top management of Toyota had long been aware of the need to develop cleaner or greater fuel saving. Environment had become an important political issue and a global concern. Technically, Toyota had long worked to reduce emissions in internal combustion engines (ICE) and it was one of the leading automakers in terms of fuel efficiency. Top management's decision to develop Prius is in line with environmental concern and technical capability. What they perceived as environmental concern, demand and having technical capability can be included in interpretive scheme that conditioned the initiation of the project of developing environmentally friendly car.

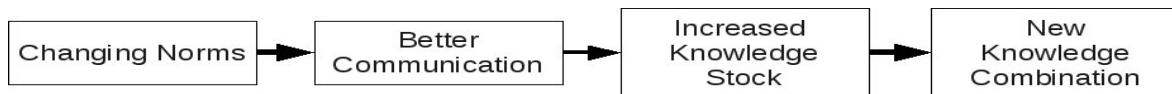


Figure 2. The Phases from Changing Norms to New Knowledge Combination

and enabling." (p. 25).

5. Explaining Knowledge Creation in Toyota Prius Case

Toyota Prius case described in Nonaka and Peltokorpi (2006) will be re-explained using structuration theory. In large organization, such as Toyota, it can be found a number of structures occur at the same time, parallel and hierarchical. Some structures (or rules within it) may support Prius initiative the other may not.

First, let us see the structure that enabled top executive's decision to initiate the project. It is important to understand the signification that shapes the view supporting the project, because, according to Akgun et al. (2007):

"The signification structure provides actors with a number of interpretative

Starting and running a project occurs within a structure of domination, which comprises allocated and authoritative resources. Allocated resources refer to capability to command over material objects or resources, such as raw materials and machineries, whereas authoritative resources refer to capability to command over people. In organization, the formal position of a person reflects his or her degree of capability to command over material and human resources. Prius project was very radical and ambitious, so it needed a strong top management support, which it got from the beginning. The origin of this project can be traced back to the executive vice-president of R&D, Mr. Yoshiro Kimbara, who started a small study group to find alternative ways to increase future competitiveness in late 1993.

Toyota has been recognized as the leading

company in auto industry. It has pioneered the just-in-time (JIT) production system. Its Lexus manufacturing plant has been well known for its highly automated production system. So, Toyota has sufficient norms to develop a very ambitious innovation.

Regardless of having excellent organizational culture, carefully selecting people is always important for a high demanding project. Mr. Ritsuke Kuboshi, the general manager of the General Engineering Division, was appointed to lead the initiative. The selection of Mr. Kuboshi was very important for this ambitious project because, "He was formerly the chief engineer of Celica, with a reputation for being aggressive and strongly determined." (Nonaka & Peltokorpi, 2006). According to structuration theory, agents and structure influence each other. Of course, the degree of influence depends on strength. To do something, which is very different from day-to-day practices, it needs a strong and determined person to lead. Toyota frequently uses this kind of project to test and select its future managers. A team member of G21 who emerged as an outstanding manager was Mr. Sateshi Ogiso who stayed with the project until the launch of the hybrid car in 1997. He was given demanding responsibility by Mr. Kuboshi when he was 32 years old, and was made responsible to prepare for the final report to the Toyota Company Board.

At the second stage of the G21 project, the project was led by Mr. Takeshi Uchiyamada, who before the assignment was a test engineer, in charge of reorganizing the laboratories. His previous responsibility made him knowledgeable about Toyota technology and able to locate the right people with the right knowledge for the project. Mr. Uchiyamada carefully selected ten team members with about ten years of experience, came from eight technological areas. They came from different units, which had according to Nonaka and Takeuchi (1995), different 'ba', or, according to structuration theory, had slightly different structure. However, "They were all in their early thirties—old enough to have expertise, but young enough to be flexible." (Nonaka & Peltokorpi, 2006).

Working for a radical innovation requires extensive communication to allow open and fast exchange of knowledge and ideas. It was

enabled by putting all the team members in one room, and "It was the first time at Toyota that a whole product-development project team had worked in one room." (p. 95). The benefits of working in one room for the team were:

"The concentration of people increased commitment, knowledge exchange, and decision-making speed. In addition, the knowledge diversity and inter-functional interaction enabled team members to develop an overview of the whole project and the various challenges involved in real time. The experiences during the project were carefully documented and, after the hybrid vehicle project, sharing one big room in new product development became a common practice at Toyota, because of the efficiency of knowledge combination" (p.95).

While working in one room would conditions team members to interact with each other, there was still other constraint, which may inhibit or limit this interaction. Norms or certain organizational culture may limit productive communication among team members. Mr. Uchiyamada tried to change the norms by creating the credos as (p. 95):

"Technology should be evaluated by everyone, regardless of specialty; one should think what is best for the product instead of representing one's own department's interests; one should not care about age or rank when discussing technologies."

Let us explain the above description using structuration theory. Each member of the team came from different unit; therefore, they may have knowledge about the reputation and competence of each other, but not sufficiently detail to be able to combine each other's knowledge. Proximity increases the frequency of communication, which is needed to deepen the knowledge about others' knowledge. However, the existing norm may inhibit more open communication or collective learning to happen. With his power, Mr. Uchiyamada tried to change it.

With open communication, each team members get to know better about other people's knowledge. So, he can develop idea

or new knowledge that synthesizes his knowledge and others' knowledge, and constructive criticism will increase the quality of knowledge and may remove errors. By allowing others know his knowledge, he also makes himself "knowledge resource" for others. So, open communication will make team members both agents and resources. Each of team members will use and be used by others.

The process of knowledge creation occurs recursively. When Mr. Uchiyamada tried to change norm, he must show in his communication and action that he was truly supporting new rules. Open communication, and the combination of knowledge also occurred recursively. Some people may open their knowledge to some degree, and wait for others' response. If they think they get fair response from their colleagues, they may increase their openness. In addition, they may not perceive correctly about others' knowledge, so they make combination of the wrong knowledge. Open communication and constructive criticism may correct the mistakes. To simplify the illustration, figure 2 gives the sequential version of the knowledge creation processes.

5. Conclusion

What do we get from using structuration theory to explain knowledge creation in a firm? Theoretical contribution to structuration theory is that knowledge is not only seen as part of the agent by which agent understands interpretive schemes, facilities and norms; but knowledge is also resource, which also implies that the agent who possess it becomes resources to others. By making knowledge as part of resources, in addition to allocated and authoritative resources, structure accommodates the concept of 'ba'.

The theoretical contribution to knowledge creation theory is that norms and other dimension of structure play significant role in the SECI model. SECI model only describe the conversion of tacit and explicit knowledge, but not about the factors affecting it. It is true that 'ba' can be used to explain it, but it is not clear enough, and does not give guidance about what to look for, whereas structure gives us information about the dimensions that affect social processes that may affect knowledge

creation.

References

- Akgun, A.E., Byrne, J., & Keskin, H, (2007), "Organizational Intelligence: A Structuration View", *Journal of Organizational Change* 20(3).
- Argyris, C., & Schon, D.A., (1978), *Organizational Learning*, Reading, MA: Addison-Wesley.
- Drucker, P.F., (1993), *Post-Capitalist Society*, Oxford: Butterworth Heinemann.
- Hamel, G. & Prahalad, C.K. (1994). *Competing for the Future*. Boston, MA: Harvard Business School Press.
- Hayek, F.A., (1945), "The Use of Knowledge in Society", *American Economic Review* 35(4): 519-530.
- Kuhn, T., (1987), "The Nature and Necessity of Scientific Revolutions", in J.A. Kourany, (Ed.), *Scientific Knowledge: Basic Issues in the Philosophy of Science*. Beldmont, CA: Wadsworth Publishing Company.
- Nelso, R.R. & Winter, S.G., (1982), *An Evolutionary Theory of Economic Change*, Cambridge, MA: Harvard University Press.
- Nonaka, I., & Peltokorpi, V., (2006), "Knowledge-Based View of Radical Innovation: Toyota Prius Case", in J. Hage & M. Meeus, (Eds.), *Innovation, Science, and Institutional Change*, Oxford: Oxford University Press.
- Nonaka, I., Toyama, R., & Nagata, A., (2000), "A Firm as a Knowledge-creating Entity: A New Perspective on the Theory of the Firm", *Industrial and Corporate Change* 9(1).
- Nonaka, I. & Takeuchi, H., (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford: Oxford University Press.
- Penrose, E. T., (1959), *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.

Polanyi, M., (1964), *Personal Knowledge: Towards a Post-Critical Philosophy*, New York, NY: Harper & Row.

Porter, M.E., (1980), *Competitive Strategy*, New York, NY: Free Press.

Prahalad, C.K. & Hamel, G., (1990), "The Core Competence of the Corporation", *Harvard Business Review* 68: 79-91.

Senge, P.M., (1990), *The Fifth Discipline: The Age and Practice of the Learning Organisation*, London: Century Business.

Simon, H. A., (1945), *Administrative Behavior*, New York, NY: Macmillan.

Teece, D.J., G. Pisano, & A. Schuen, (1997), "Dynamic Capabilities and Strategic Management", *Strategic Management Journal* 18(7): 509-533.

Analysis of Utilization of Hydrum Pump's Water Source for Catfish Culture and Paddy Cultivation (Case Study at Jinkang Village Subdistrict of Tanjung Kerta-District of Sumedang)

R. Ismu Tribowo

Center of Appropriate Technology Development-Indonesian Institute of Sciences, Subang, Indonesia

Abstract

Hydrum (hydraulic ram) pump is a kind of water pump, which worked by utilizing the potential energy of waterfall that conveyed through the inlet pipe of the pump, continuously non-stopping run. One unit of the hydrum pump manufactured by Center of Appropriate Technology Development Indonesian Institute of Sciences (B2PTTG-LIPI) is able to lift the water up to 162 meter for serving irrigation water of catfish culture and paddy cultivation with the water stream size in the average of 2 liter/minute at Jinkang Village, district of Sumedang. The area has been used for catfish culture is actually the converted of the paddy field which covered up to 2 hectares. The maximum of the modulus of irrigation for catfish culture is 3.67 liter/second/hectare occurred on August. The irrigation interval for catfish pond has been designed once every 28 up to 31 days. For every 645 m² of single pond need 28.77 m³/hour of water stream size. In this case need 240 units of hydrum pump. The maximum of the modulus of irrigation for paddy cultivation is 0.28 liter/second/hectare occurred on July, August, and October. The irrigation interval is once a day. For every 250 m² of single paddy field need 5.76 m³/hour of water stream size. In this case need 48 units of hydrum pump.

Keywords: catfish culture, paddy cultivation, irrigation, hydrum pump

1 Introduction

1.1 Background



Figure 1. The Prototype of Hydrum Pump

The automatic hydrum (*hydraulic ram*) pump is a kind of water pump (Fig. 1), work by utilizing the potential energy from the existing of the waterfall and conveys it through the inlet pipe of the pump. The term automatic is referred to it works by its own energy and unnecessary to watch it by the operator, and able to run continuously throughout the time. We may often have seen that some location actually have much water from its water spring, however the problem will rise up when the water level of the spring is far away below its required location.

One of ways to lift the water from the lower level up to the higher level is to utilize the hydrum pump. The pump works based on the potential difference of the location of the water spring, in other word the pump works based on its own characteristic of water physics. The pump is able to lift an amount of water from the lower site up to more than 100 m of the higher level.

The pump's construction is made from components of galvanic fittings pipes; it can be quick constructed and turned loose so the maintenance is relatively easy to be done (Agusto, 1984). One unit of the hydrum pump manufactured by B2PTTG-LIPI in Subang-West Java is able to lift the water up to 162 meter with the water stream size in the average of 2 liter/minute at Jinkang village, Sumedang, West Java (Tribowo, 1998).

The papers have been conducted before over the utilization of the shallow and deep ground water with submersible and centrifugal pumps as well for dumbo catfish culture and its link with the paddy field for a case study at north coast area of West Java and Indramayu lowland (Tribowo, 2009). The field, which is used for dumbo catfish culture, is originated from the conversion of the paddy field.

To acquire moreover follow up when dumbo catfish culture and paddy field

cultivation is conducted at Jingsang-Sumedang-West Java highland, with the water source taken from the water spring flows down the hill and lifted it up by utilizing the hydrum pump technology, in this case this paper is conducted.

1.2 Aim

To analyze the utilization of the water source taken from hydrum pump for dumbo catfish culture and its link with the dry paddy field cultivation under the same area and location.

1.3 Methodology

The topography map covered the required water location and the water source and its vicinity is set up with utilizing the theodolite equipment. Based on the map, one is able to see the height and the distance of the waterfall for the inlet of the hydrum pump and the outlet from the hydrum pump to the end of the outlet pipe at the water container.

The water source stream size is also necessary to determine whether the installation of the hydrum pump is suitable. An installation of the hydrum pump can be constructed when at the location is available to get the water source that flows with the water stream size not less than 5 liter/minute continuously throughout the year and has a different height of location that lower than the water source not less than 1 (one) meter. The hydrum pump under consideration is designed and manufactured by B2PTTG-LIPI at Subang-West Java.

Regard to the water source being used is taken from hydrum pump, therefore to irrigate water efficiently for paddy cultivation, drips irrigation system is chosen into consideration, while for the variety of the planted paddy is dry land paddy variety (Cavanagh, 2005; Fukai & Inthapa, 2005). The optimized crop water requirement is calculated begin from planting season up till harvest season. The crop season of the dry paddy cultivation is assumed about 110 days and rotated with baby corn, which has about 65 days of crop season (Tribowo, & Sukirno, 2007).

The designing irrigation system will include designing calendar and pattern of dumbo catfish culture and paddy cultivation as well, calculation of modulus irrigation (water requirement at pond/crop level), calculation of maximum irrigation interval, calculation of

maximum irrigation delivery time, and calculation of water stream size requirement (Meijer, 1989). Calculation of *Reference Crop Evapotranspiration* (ET_o) use *Blaney-Criddle* method (Doorenbos, et. al., 1984).

1.4 Considered Location

Jingsang village is a self-supporting village under sub district of Tanjung Kerta, at the north part adjacent with sub district of Buah Batu, at the south part adjacent with Kertamukti village, at the west part adjacent with district of Subang and at the east part adjacent with Kamal village. Jingsang village located at 500 up to 600 meter above sea level with 2,000 up to 3,000 mm/year of precipitation, the area is sprawl over 2,246.072 hectare with 1,175 KK/leader of family (Tim Hydrum, 1997).

2. References

The hydrum pump requires a certain condition to run it. Theory of physics that supporting the design manufacture and implementation the hydrum pump system will be elaborated at the following up next.

2.1 Hydrum Pump

The hydrum pump works based on the process of momentum change (impulse) and the water that can't be compressed. When the waterfall is conveyed through pipeline and at the end of outlet pipe is suddenly closed, it will change the water stream velocity (Fig. 2). The size of the water stream velocity (v) can be shown from the eternity of energy law:

$$\begin{aligned} \text{Potential Energy} &= \text{Kinetic Energy} \\ mgh &= \frac{1}{2} mv^2 \quad [1] \\ v &= \sqrt{2gh} \quad [2] \end{aligned}$$

Physically it can be seen that the size of the velocity is depend on the size of the difference height of the fall of water (h). Multiplying velocity against mass (water) is momentum. When the velocity at time t + t1 is v1 and at time t + t2 is v2, the momentum change can be expressed as:

$$F(t_2 - t_1) = mv_2 - mv_1 \quad [3]$$

The momentum change is commonly said as impulse. Accordingly the hydrum pump works based on the momentum change

(impulse) principle. The change of the water stream velocity is shown at the moment of the opening and closing of the drain valve. This

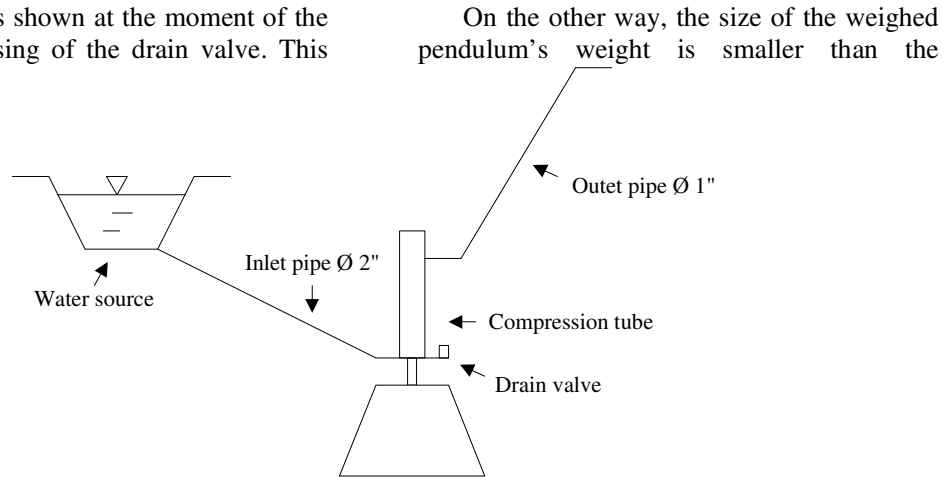


Figure 2. The Sketch of the Operational of Hydrum Pump

valve is a regulator to make the change of the water stream velocity that causes impulse. When the valve in open position, water will flow out begin with zero velocity and up until maximum velocity that can be gained by the water source. When the valve in closed position, water can't flow anymore, this condition means that the water stream velocity is zero.

With placing a rubber valve can get its opened and closed drain valve position, while to place a weighed pendulum can regulate the range time of its opened and closed valve. Impulse regulation that appeared due to its opened and closed valve determined by the size of the weighed pendulum's weight force and the distance of the valve's step.

The weight size of the weighed pendulum can be regulated with considering:

- a. The size of the dynamic push force, i.e. the force that appeared due to the existing of the water flow in the pipe.
- b. The static push force, i.e. the force that appeared due to the water's weight at the moment that the water is not flow in the pipe.

Therefore the weighed pendulum has to fulfill the unequation:

$$F_s < F_b < F_d$$

where:

- F_s = static push force
- F_b = weight of weighed pendulum
- F_d = dynamic push force

On the other way, the size of the weighed pendulum's weight is smaller than the

dynamic push force and higher than the static push force.

2.2 Drips Irrigation System

Design of the drips irrigation system will include designing crops calendar and pattern where this design up next will determine the irrigation water requirement at crop level (modulus of irrigation). Design will be followed by calculation of maximum irrigation interval, calculation of maximum irrigation duration time of every water emitter/dripper, calculation of water's volume requirement and the height of the water tower/container and piping system for operational of irrigation system, and designing timetable rotation of irrigation.

The calculation of irrigation water requirement use equation as follow:

$$qo \text{ fld} = 100/ea \times qo \text{ ltr/sec/ha} \quad [4]$$

$$qo = IR \text{ (mm/day)} \times 0.116 \text{ (l/sec/ha)} \quad [5]$$

$$IR = WR - WS \quad [6]$$

$$WS = R.Eff.pot. \times a \times t \quad [7]$$

$$R.eff.pot. = R \times Pot.Eff. \quad [8]$$

$$WR = (Etm \times a1 \times t) + (S \times a2) \quad [9]$$

$$Etm = Kc \times Eto \quad [10]$$

Explanation of symbols:

- qo : modulus of irrigation
- $qo \text{ fld}$: water requirement at emitter level
- ea : irrigation application efficiency
- WS : natural/available water supply
- $R.Eff.pot.$: potential effective precipitation

Pot.Eff. : percentage of amount of precipitation absorbed by the soil
 R : monthly average precipitation
 a : area fraction
 t : time fraction
 WR : crop water requirement
 Etm : Maximum evapotranspiration
 a1 : area fraction of Etm
 a2 : area fraction of irrigation water requirement
 S : water supply
 Kc : crop factor
 Eto : evapotranspiration

The calculation of maximum irrigation interval use equation:

$$ni \text{ max.} = TRAM/qd \quad [11]$$

$$TRAM = AM \times P \quad [12]$$

$$qd = Etm - R \text{ eff.pot.} + qp - qc \quad [13]$$

Explanation of symbol:

ni max.: maximum irrigation interval

TRAM: total available soil water content

AM: available soil water content

P : depletion fraction of soil water content

qd : average depletion rate

qp : percolation rate

qc : capillary rate

The calculation of maximum irrigation duration time of every water emitter, need data of modulus of irrigation and specification of the emitter itself.

The calculation of water's volume requirement and the height of the water tower/container, need to make a map of piping layout including its emitter.

The pressure loses in the pipes due to friction, water stream size and the required height of pressure calculated gradually; begin from distribution pipe with its emitter, transmission-distribution pipes, and fittings.

3. Results and Discussion

3.1 Hydrum Pump

The distance between the water spring and the hydrum pump has been designed with the different height of about 29 meter and pipe length of about 136 meter. Therefore, theoretically (for reference in the field i.e. for about 1 meter of the height of the fall of water can lift the water up till 10 meter, but than

other conditions should be concerned i.e. maximum length of the inlet pipe etc.) the pump is able to lift the water up to 290 meter, therefore to lift water up to 162 meter high which located in the side of village street can be fulfilled.

From the observation in the field, the outlet water stream size from 1 unit of the hydrum pump is about 2 liter/minute. Adding the number of the Hydrum Pump can enlarge this stream size.

3.2 Water Requirement of Dumbo Catfish Culture and Dry Land Paddy Cultivation



Figure 3. The ponds of Catfish Culture

From the extended calculation began with the average precipitation and evapotranspiration at the considered location, got the amount of water requirement at pond level (modulus of irrigation of dumbo catfish culture). The ponds field of dumbo catfish can be seen at Fig.3. The maximum of water requirement of the fishpond is 3.67 liter/sec/hectare, which occurred on month August (Tribowo, 2009). The pattern and calendar of catfish culture can be seen at Table 1.

The farm field where the drips irrigation system design takes place (Fig.4) has silty medium sand texture from surface soil to 5 meter of soil depth. Therefore for the upper soil layer (0 to 25 cm depth) has 18% of wilting point water content and 38% of field capacity water content. At the soil depth of 25 to 100 cm where the crop's root still take place has 16% of wilting point water content and 34% of field capacity water content (Tribowo, 1989).

The maximum of modulus of irrigation (qo) of dry land paddy occurred on month July, August and October, which required 0.28 liter/second/hectare of water (Tribowo, 2009).

The pattern and calendar crop of dry land paddy can be seen at Table 2.



Figure 4. Installation of Drips Irrigation System

The irrigation interval for catfish pond has been designed once for every 28 to 31 days (this is done because of the initial water supply of 750 mm for months November, February, May and August is the condition should be fulfilled for the optimum water height for catfish culture, see Table 1). The amount of water supply for interval of 31 days (August) is 981 mm.

When the area of dumbo catfish culture around 2 hectare containing 31 parts of ponds, the area of every single part of pond is about 645 m² with its water volume of 633 m³. Every single pond will require 28.77 m³/day of water stream size.

3.3 Maximum of Water Stream Size

A. The Pond of Dumbo Catfish

Table 1. Pattern and Calendar of Catfish Culture included Period Fraction (a: area, t: time)

Period Days	Nov 30	Dec 31	Jan 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31
Growing stage	growing		growing			growing			growing			
a (fraction)	1 2		3 ¹ 3 ²	1 2		3 ¹ 3 ²	1 2		3 ¹ 3 ²	1 2		3 ¹ 3 ²
t (fraction)	→											
Spec.req. mm	750			750			750			750		

(Source: Tribowo, 2009).

Explanation/assumption:

- Land preparation season (1) is 20 days for the whole land (20 hectare).
- Planting season (2)/first harvest (3¹); last harvest (3²) are 5 days for the whole land (20 hectare).
- Land used for catfish culture (begin with little catfish up till harvest will consume time of 2 months) throughout the year i.e. November to January, February to April, May to July, and August to October.
- Spec.req: special water requirement.

Table 2. Pattern and Calendar Crops of Dry Land Paddy and Baby Corn

Period Days	Nov 30	Dec 31	Jan 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31
a (fraction)	1 2				3 ¹ 2			3 ¹ 1	2			3
t (fraction)	→											

(Source: Tribowo, 2009).

Explanation/assumption:

- Land preparation season (1) is 20 days for the whole land (20 hectare).

- Planting season (2) and harvest season (3) are 10 days for the whole land (20 hectare).
- Land is planted by dry land paddy twice a year (middle of November to begin of March and begin of July to middle of October) and planted by baby corn (last March to begin of June) once a year.

B. Paddy Field with Drips Irrigation System

Part of the drips irrigation system can be seen at Fig. 5. The water source is taken from the hydram pump. From 1,000 m² area of the land, 36 of beds are made with 40 cm of height, 100 cm width and 2,000 cm length. Every single bed is installed by one lateral pipe.

Along lateral pipe, for every 25 cm installed distribution plastic hosepipe with its emitter of plastic screw type. Therefore every bed contains 80 emitters. To control the weed and reducing the evaporation from the ground surface, doing so every bed was covered by black-silver plastic mulch. Water container is made from fiberglass, which placed one meter or more above the ground surface. The average of the emitter water stream size is 8 liter/hour.



Figure 5. Drips Irrigation and Plastic Mulch

The maximum of modulus of irrigation (q_0) of dry land paddy occurred on month July, August and October, which required 0.28 liter/second/hectare of water. With the assumption of 90% efficiency of water used, then the water irrigation requirement which flown out from the emitter/dripper is 2.67 mm/day. The interval of irrigation has been designed once per day.

With the assumption of 100% of the percentage of wetted soil due to water dripped by the emitter and the area of wetted soil is 0.25 m²/emitter, and then the water volume in the wetted soil due to water dripped by the emitter is 0.67 liter. The maximum irrigation duration time is 5 minute and 2 second.

The area of the paddy field is 2 ha. It has been designed that every day has 80 times rotation of irrigation. (Irrigation time becomes 402 minute and 40 second or 6.7 hours). Every rotation serves 250 m² of field's area, which contain 720 emitters.

The required water stream size for irrigation to every single of paddy field with the area of 250 m² is 5,760 liter/hour or 1.6 liter/second.

3.4 Water Stream Size and Hydram Pump Requirement

Every single catfish pond with the area of 645 m² requires 28.77 m³/hour of irrigation water. Therefore required 240 units of hydram pump.

Every rotation of drips irrigation serves 250 m² of paddy field contained 720 emitters. Every single paddy field with the area of 250 m² requires 5.76 m³/hour of irrigation water. Therefore required 48 units of hydram pump. The installation of more than one hydram pump from one water source can be seen at Fig. 6.



Figure 6. Installation of More than One Hydram Pump in Parallel Way

4. Conclusion

The automatic hydram (*hydraulic ram*) pump is a kind of water pump, work by utilizing the potential energy from the existing of the waterfall and convey it through the inlet pipe of the pump and able to run continuously throughout the time.

One unit of the hydram pump manufactured by B2PTTG-LIPI in Subang-West Java, is able to lift the water up to 162 meter with the water stream size in the average of 2 liter/minute at Jinkang village, Sumedang, West Java.

The area has been used for catfish culture is actually the converted of the paddy field which covered up to 2 hectares. The maximum of the modulus of irrigation for catfish culture is 3.67 liter/second/hectare occurred on August. The irrigation interval for catfish pond has been designed once every 28 up to 31 days. For every 645 m² of single pond, need 28.77 m³/hour of water stream size. In this case required 240 units of hydram pump.

The irrigation system utilized for watering 2 hectare of paddy field area is drips irrigation system. The maximum of modulus of irrigation of dry land paddy occurred on month July, August, and October, which required 0.28 liter/second/hectare of water. The interval of irrigation has been designed once per day. The average of the emitter water stream size is 8 liter/hour.

The maximum irrigation duration time is 5 minute and 2 second. It has been designed that every day has 80 times rotation of irrigation. Irrigation time becomes 402 minute and 40 second or 6.7 hours. Every rotation of drips irrigation serves 250 m² of paddy field contains 720 emitters. Every single paddy field with the area of 250 m² requires 5.76 m³/hour of irrigation water. Therefore, required 48 units of hydram pump.

References

Agusto, W.M., (1984), *Instalasi Pompa Hydram*, Bandung: Lembaga Fisika Nasional.

Cavanagh E., (2005), "The Importance of Increased Water Efficiency in Rice Production", Retrieved from <http://www.world.foodprize.org/youthinstitute/04institute/04proceedings/bettendorf.pdf>.

Doorenbos, et al., (1984), n.t., *Crop Water Requirements, Irrigation and Design Paper* No. 24: 144.

Fukai, S. & Inthapan, P., (2005), "Growth and Yield of Rice Cultivars under Sprinkler Irrigation in South-eastern Queensland. 1. Effects of Sowing Time", Retrieved from <http://www.publish.csiro.au/nid/72/paper/EA9850636.htm>.

Meijer, T.K.E., (1989), *Sprinkler & Trickler Irrigation*, Department of Irrigation and Civil Engineering, Agricultural University, Wageningen, the Netherlands.

Tim Hydram BPTTG-P3FT-LIPI, (1997), *Instalasi Pompa Hydram di Desa Jinkang Kecamatan Tanjung Kerta Kabupaten Sumedang*, Subang: BPTTG-P3FT-LIPI.

Tribowo R.I., (2009), *Sumber Air Tanah dengan Pompa Submersible untuk Budidaya Ikan Lele Dumbo dan Kaitannya dengan Lahan Padi*, Subang: Balai Besar Pengembangan Teknologi Tepat Guna-LIPI.

Tribowo R.I., (2004), "Drips Irrigation and Its Alike Technology Development as A Part of A High Efficient Irrigation System", *Proceedings of International Seminar on Advanced Agricultural Engineering and Farm Work Operation, CREATA-IPB, JSFWR-Japan, PERTETA and Bogor Agricultural University*: 167-188, Bogor.

Tribowo, R.I., (1998), *Analisis Pemanfaatan Pompa Hydram Sebagai Alternatif Penyedia Air Irigasi Sistem Tetes Untuk Budidaya Tanaman Cabai*, Lembaga Ilmu Pengetahuan Indonesia.

Tribowo, R.I. & Sukirno, (2007), "Analisis Pemanfaatan Irigasi Hemat Air Sistem Sprinkler untuk Budidaya Tanaman Padi Lahan Kering dan Hortikultura Organik", *Buku Prosiding Seminar Nasional Teknik Kimia, Jurusan Teknik Kimia, Fakultas Teknologi Industri, Universitas Katolik Parahyangan*, Bandung.

Benefit of Information Technology in the Criminal Trial System Workings Observation in Central Java

Agus Raharjo¹, Nurul Hidayat², and Sunaryo³

^{1,3}Faculty of Law, Jenderal Soedirman University (UNSOED), Indonesia

²Study Program Information Engineering, Faculty of Sains and Engineering, Jenderal Soedirman University (UNSOED), Indonesia

Abstract

Criminal Justice System did an approach of system. Focus of this research is effort to make a society participation model in observation to the working of criminal justice system. Method which used in this research is law as action is social science study which is non-doctrinal and have the character of empiric. Experimentation test to made software to be done to find really exactly model. Criminal Justice System has criminogen characteristic, and this is one of the factor causing society participation level to enforcement of law in Indonesia lower. Effort to improve society participation in this case use information technology which in the form of ready of software able to be accessed by whosoever and wherever. This effort expect also can improve image of enforcement of law which till now is bad.

Keyword: Criminal justice system, community empowerment, community participation, information technology

1. Preliminary

Criminal law enforcement conducted in a system called the Criminal Justice System (CJS). In the CJS, there are supporting institutions, namely the police, judiciary, courts, and correctional institutions. Although criminal law enforcement has been implemented in a system, but the results is still far from expectations that Indonesia in the same category as one of the countries with the worst reputation in law enforcement.

One cause of the bad reputation it is the performance of law enforcement officers are less good, in terms of ethics or morals or integrity in terms of employment. A result that appears is the principle of justice is fast, simple and low cost can not be reached so that congestion occurs at all levels of case justice. Another consequence was the decision taken either by the police, prosecutors and courts of justice is sometimes just about providing bureaucratic laws only apply it, rather than substantial justice.

Description of the image of law enforcement and police performance as described above, causing Criminal Justice System has criminology properties, in case of practices that are inconsistent with the view justice system both as a physical system as well as an abstract system. Condition The background of this also by the fact that interaction, interconnection, and interdependence are the main characteristic of a system (Muladi, 1995).

Criminology factor of Criminal Justice System (CJS) can be caused by several problems. Firstly, relating to criminal legislation that created what is called the legislated environment. The problem that arises here is accuracy in making the criminalization as a process for making an act which was originally not be a criminal offense (Sudarto, 1986; Arief, 1994). Diligence in the criminalization and the proper use of the subsidiary principle can avoid devaluation over-criminalization and criminal law. Second, directly attributable to the CJS is the fact effectiveness is limited. This issue is related to the ability of supporting infrastructure such as facilities and infrastructure, the ability of law enforcement professionals and legal culture of society. Third, the problems that arise indirectly from criminal disparity (disparity of sentencing), regarded as the disturbing issue in CJS (Muladi, 1995).

Criminal justice practices that lead to opportunities to make profits and thus minimize the public to participate caused criminal justice is criminology. This could be prevented by the existence of community participation with the utilization of information technology in the monitoring of the workings of the CJS. Supervision is not only done when the judicial process or in the courtroom, because the potential for corruption or criminology that just outside the courtroom. An independent country (the Police Commission, Commission Attorney, and the Police Commission) has not been able to reach as a whole against such practices.

Lack of access and lack of information from the hard work of the CJS causes people to get justice, at once difficult to uncover crimes committed by law enforcement officers. Seeing this, the improvement of the performance of the CJS can not be done without community empowerment. Without the empowerment of communities, the goal of law in the form justice will be increasingly out of reach (Puji Rahayu, 2001), and judicial efforts to realize a clean, dignified and free from corruption, collusion and nepotism difficult to materialize.

Empowerment is a force to be able to access to resources so that there is a fair division of power that can raise awareness about their existence. Empowering communities can be done through a participatory process. Participation is the practice of justice, therefore the understanding of people's participation as an empowerment or empowering people include the practice of justice and the right to enjoy the fruits of development that may lead to conflict between the parties concerned.

Community empowerment can be done through various ways, one of which is the utilization of existing resources. Information technology is one resource that can be used to it. The government has set the empowerment of information technology towards the realization of civilized society of information. If the awareness of unconscious information by all components of the nation, then this nation will rise up to its triumph. Based on the above, then the initiative to create community information becomes urgent needs that need to be realized.

Based on the above, then formulated a model of public participation in oversight of the workings of the criminal justice system by utilizing information technology. The model was later not only is the feedback or feedback to the institutions of criminal justice in which case the process is running, but once connected to the commission countries associated with the oversight of the workings of the CJS. This model gives space to the community to participate through providing information about the workings of a criminal case or law enforcement officials so that public involvement in law enforcement rather than be a mere utopia. Because information technology is used in this case, the participation of the community can work across institutional boundaries are monitored, so that the constraints of distance, time and cost can be overcome. If the problem can be overcome, then the CJS and the

performance improvement community needs will be public information about cases that were completed or the performance of its officials into a demand for improved professionalism.

This paper is based on research conducted in Central Java to the utilization of information technology in an effort to increase community participation in improving the oversight of the workings of the criminal justice system. Monitoring by the community is important to remember those who directly engage with the tasks of law enforcement institutions are public. Society that felt satisfied or dissatisfied with their service and community can also provide accurate information, whether as a party to a lawsuit as well as observers. The search of public participation in enforcement and supervision of the workings of the criminal justice system is an ingredient to make a model of community participation in oversight of the workings of the criminal justice system that is expected to answer the shortcomings and weaknesses in supervisory model for this is less satisfactory.

2. Problems

The problems posed in the study are as follows:

1. What are the factors that hinder people's participation in law enforcement?
2. What steps should be taken to improve supervision by society to the workings of the criminal justice system?
3. Models such as whether community participation can improve public oversight of the workings of the criminal justice system?

3. Research Methods

This research is qualitative research, normative and juridical approach to the law as the law in action, a social science that studies the non-doctrinal and empirical. In the non-doctrinal research, researchers will focus attention on the activities of criminals (the suspect), victims of crime (or family) and law enforcement officials (police, prosecutors, judges and lawyers), as well as society in participation oversee the workings of the criminal justice system. Specification of this study is descriptive with data sources such as human behavior, events, documents, archives and objects other. This research is the Central Java Province to sampling location and research

informants in a purposive sampling. Data collected by the interactive and non interactive method and analyzed with a model of interactive analysis and flow analysis.

4. Research Results

4.1 Criminal Justice System Works

Settlement of a criminal case can be made through non-litigation and litigation. Line non-litigation is an alternative route which was not recognized by the principal rules of criminal procedural law, namely the Criminal Procedure Code. But its existence is recognized by the public and used as one way to solve a criminal case. Criminal Procedure Code determines criminal settlement model as seen in boaster below.

Criminal Procedure Code adopted due process of law (a fair legal process) that the meaning is much broader than simply the application of laws or regulations formally. According Mardjono Reksodiputro (1993), should understanding of a fair legal process contains the same inner attitude of respect toward rights belonging to citizens, although he became a perpetrator of a crime.

System prescribed in the Penal Code by Mardjono Reskodiputro (1993) and Atmasasmita (1983, 1996), in broad outline can be divided into three stages:

1. Stage before the trial or pre-adjudication (pre-adjudication);
2. Phase court or stage of the adjudication (adjudication); and
3. Stage after stage of full-court or adjudication (post-adjudication).

According Mardjono (1993), the adjudication phase is the dominant phase. It is based on the Criminal Procedure Code which states that both in the free decision, or verdict of guilt, it must be based on facts and circumstances as well as tools from the examination of evidence obtained in trial. According to him, CJS is an honest desire to protect the rights of a citizen who becomes a defendant, will be most clearly revealed in the adjudication stage. Only in the stage before the court the defendant and defense counsel can stand upright as the party rank at the same time really dealing with the public prosecutor.

In the adjudication stage are fully guarantee the rights of both parties, public prosecutors are indicting rights and the rights of the accused is defending him self against the charges.

Assurance that this management must be granted by the court and in fact can only take place if we can always believe in the impartiality and independence of judge. A fair legal process in which there is belief in a free trial is very important for the security of society, no less important than tackling the business of crime (Permits, 1993).

Mardjono opinion was opposed by Romli Atmasasmita. Romli (1996) does not deny that the adjudication phase is an important stage in the CJS, but not the dominant phase. According to him, viewed from the point of criminology and victimology, the process of stigmatization has been running ever since the pre namely at the stage-adjudication detention and arrest. At the adjudication stage of the process of stigmatization and victimization occur structurally, even this process is running since the investigation stage.

All cases that have been entered into the police, it will be processed by the police and will be created for the Report on Examination (P-21) as a material for the prosecutor to prepare the indictment, trial and prosecution of the implementation process. All this process is given later by the court verdict, whether it is the decision of punishment (which means it must immediately go to the correctional institution) or the decision is free or free from all legal charges (which means back to the community).

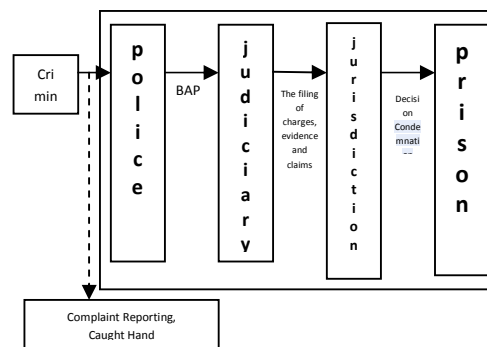


Figure 1. According to the Model Criminal Code of Criminal Case Resolutions

Does this process ensure the disclosure of truth and justice? This question is for the institution in the CJS is not an absolute measure, because the basic work of the CJS is the law and the workings of the institution through a bureaucratic red tape and called the court. For justice bureaucracy was taken, the procedure is properly executed, then the verdict was regarded

as unfair. In fact, justice is not justice that resulted in a substantial sense of procedural fairness but rather, that justice is obtained after performing a series of specific procedures or it can be said also as a justice bureaucracy.

The value that protrudes from the criminal justice system objectives, as expressed by Mardjono Reksodiputro (1993, 1994) is to solve crime cases that occurred so that the community is satisfied that justice has been done and the guilty convicted. To find the truth and justice, the judicial system criminal work through a bureaucracy called the judicial bureaucracy. CJS is working with the positivistic approach to law-analytical, in which this way to give excessive attention on the principles, doctrine and legislation governing the CJS.

In solving the problem, the discovery of truth and justice as well as means of control of community activities, the law is not the only tool and that too not the most powerful. Rakyat or the public is entitled to receive and obtain truth and justice, problem-solving that does not cause a problem again at a later date. System is the formal criminal justice facilities as a result of the development of modern law to achieve this, but outside the CJS, there are other means that can provide a more satisfying justice or in terms of Hart (1972) spoken as the primary rules of obligation, namely the rules of the society which was formed spontaneously by members of the community fully.

In addition to the above problems, the CJS is run by humans, so the speed and accuracy in completion of a criminal case not only determined by the rules of procedure or mere. Human beings have a wide range of complexity and with its complexity that can affect performance in the settlement of criminal cases handled. Behavior law enforcement officers are often the factors that worsen the performance of the institution. The factors of this behavior creates an image of the institution or institutional performance, and if the image is bad then the person or legal entity does not have the interest to submit the matter to law enforcers.

There are many ways and places to get justice; criminal justice is only one way and place that can be achieved. Justice can be found anywhere, in any space, "Justice in many rooms," said Marc Galanter (1981, Cotterrell, 2001). When the CJS can not provide justice to expect, so those with problems can seek another alternative that can provide that hope. For

people who are still holding strong customary laws, customary courts can look at and for the people have high religiosity can search through the law of his religion.

Criminal law in future should pay attention to those aspects related to the human condition, nature and tradition that has been entrenched in the culture of the Indonesian nation (Muladi, 1990). At the present, where the law is the law of justice practiced in the modern , needs to consider other means of social control that exist in society. Absolute settlement of criminal cases through the litigation will not be supporting the function of criminal law as an ultimum remedium. Indonesia should also pay attention to the condition farraginous diversity, and not rely solely on the performance of the CJS to get justice, because justice is in a lot of space.

4.2 Community Empowerment and Utilization of Information Technology in the Supervision of the Criminal Justice System Works

Based on the mechanism contained in Law No. 8 in 1981, in fact every criminal case that has been entered or handled by the Police, should proceed to trial before the court, unless there are specific reasons that led to a criminal case only came to police or prosecutors. But often, a criminal case which has the potential to stand trial before the court can be solved by the police. This issue is sticking out when there were indications that within the body of the police there is a "game" that led to a criminal case can be terminated investigation. This can happen because there is legal discrimination in criminal law enforcement. Donald Black (1976) introduces the five aspects that resulted in discrimination law. These five aspects are stratification, morphology, culture, organization and social control.

Lengthy criminal justice process turned out to be only focused on the perpetrators of crimes only, while the victim is in an unfavorable position. The result (Angkasa, et al., 2006) proves that the position of victims in criminal justice has not been a concern that still bear his own misery without any attempt to do restitution or compensation, either by state or perpetrators of crime.

Another factor that determines the image of law enforcement in Indonesia is the behavior of law enforcement officers, who often make bad law enforcement image. A philosopher Taverne (in Ali, 2002; relied with Marc Galanter in

Ihromi, 2003) had revealed, "Give I am an honest and intelligent prosecutors, judges who give me an honest and intelligent, then by law the most bedness, I will make a good decision." By looking at this phrase is actually the problem in law enforcement rather than on legal rules, but rather to his conscience, and talk about conscience, of course we will talk about law enforcement ethics or morals.

Based on this research, the law enforcement institutions (especially police, judiciary, and courts) in order to feel already implementing legislation to involve public participation in enforcement. For society Institutions that are more closed, participation can be optimally implemented yet because of coaching for inmates are closed, especially for new inmates undergo a criminal (the insulation). But the form of public participation at all three institutions are still in the normative level, that is a complaint or to report cases or criminal cases are dealt with, while the participation of the community who do not become victims or perpetrators crime cannot be optimally implemented, and alternative road is through the mass media. The difficulties faced in carrying out the mandate of this law are not fixed by the form of public participation, so that more law enforcement agencies are waiting.

Community participation in monitoring of the actual workings of the criminal justice system is not limited to the report or complaint only. For the other parties that do not become victims or perpetrators of crime (or family) may be in the vanguard of this matter until the implementation process of the court's verdict in the correctional institution. Understanding enforcement laws that restrict public participation process of the investigation only to the extent it raises substantial resistance against the abuse of authority by law enforcement officers. Let's say that in an effort to find the material truth in the process of investigation, a suspect can be summoned at any time for interrogation without the presence or accompanied by counsel law or when the interrogations carried out in the middle of the night that did not allow for attorneys to come. The condition also can cause further abuses of police brutality, both in small scale (hardness by using a cigarette butt or hands) or on a large scale that causes serious injuries.

Understanding of law enforcement to limit the role of society (which is limited to the litigant parties only) resulted in sales and

purchase information. At the level of the prosecutor, someone who wanted information about a lawsuit, someone - even the litigants and legal advisers, especially those which have nothing do with these things but it has great attention to the way the case was - must pay a certain amount of money to get information. Apparently, this opportunity is used by law enforcement officials to gain advantage by misusing authority or position. If such a condition remains preserved, which will worsen image of enforcement and law enforcement in Indonesia, which had slumped to the bottom of this ravine, leading to the decay law.

In court, public participation is also more limited again. The parties are litigants, may take an active role in seeking and finding the truth, while the party who was not involved in the case "only" can be a spectator or observer allowed path without judicial intervention. In addition to the parties' litigants, legal adviser is a person who can participate actively in determining which witnesses to present in court. But it was revealed that to cases involving people with high socioeconomic status, the proceedings are governed as such or in other words already "conditioned" by the legal counsel, so that the attorneys in this case like an event organizer. This is what fosters judicial mafia on Indonesian soil.

Similarly, in correctional institutions, public participation can also not optimally implemented. Guidance for the convicts is closed and no public intervention in the coaching process. Even in the guidance that involves clergy/religious leaders for spiritual guidance, but for the coaching conducted by correctional institutions cannot be supervised directly by the public. Society standard coaching in organizations has indeed been set by the Directorate General of Corrections, but in practice it is also inevitable abuses of power by officials that violence by officers against prisoners becoming more common.

Closing law enforcement information due to the attitude or culture which does not allow public institutions involved too much in the oversight of the workings of the criminal justice system is causing people are reluctant to get involved in it. This reluctance led to the practices of power abuse become infertile and cannot be controlled. If society around the nets cannot control the judiciary, especially those who are outside the circle a criminal case, would definitely be more difficult. Disclosure of

public information is the mandate of law which must be implemented and this requires the support systems and mechanisms toward the establishment of a civilized society information.

Limitations information infrastructure led to the acquisition of information on the course of a winding path of justice. For those who are involved in a criminal case (victim, perpetrator or his family) can directly ask the law enforcement agency where the case was being reviewed. To the public who wish know the case which became his attention may attend the hearing. The problem that arises is if the parties involved (victim, perpetrator or his family) and the general public who want to know the course of justice but are outside the city, nobody can follow the progress and supervise litigation/trial is being implemented.

Major concern of law enforcement against public involvement in the judicial process is the fear of bias on the case at hand. Community involvement is not in the sense of direct involvement and interfere with the judicial process, but more than that is overseeing the judiciary, so the use of authority or power held law enforcement can be controlled so as not to arrive at a dangerous level.

The fundamental problem that causes low levels of public participation in oversight of the workings of the criminal justice system is communication. How agencies in communicating what the CJS to the public is an obstacle that must soon be overcome. Slogans such as police stating that "we are ready to serve" is not to only a myth that continues to prove his lies. If the slogan was upheld as work ethics, then the problem of communication with the community rather than an impediment. So at this level of communication problems lies in institutional willingness to be open to the public in the acquisition and provision of information to the public. This problem can be compounded by human resource capacity which can not apply the willingness of the institution.

In addition to problem institutions willingness and ability of human resources, other factors have an important role in promoting community participation is the availability of communications infrastructure (information technology) in each law enforcement agency. Based on the observations (observation) researchers, the state of each institution law enforcement agencies in the communications infrastructure varies, but in general we can say that they have made use of

information technology. Computers for example, has become commonplace and can be found easily in the law enforcement agency, as well as with modems that connect computers to the Internet network. However, limited access and people may cause computer and network access the internet only for information only. Computer more widely used as a substitute for a typewriter. There has been no effort from each agency to create its own website that allows the delivery of information can be presented quickly.

Agencies that have used information technology to enhance community participation in law enforcement are the police. This institution using short message service (SMS) to accommodate the aspirations and community information about good law enforcement reports concerning the crime or other purposes related to police duties. Other institution has not been seen using this facility for the benefit of the institution. Websites are available for a new police on the police level, so that the new limited information available on the activities of the Central Java Regional Police, not to cover all district police across Central Java.

With all the limitations of information technology infrastructure, there is a kind of optimism from the law enforcement community that participation can be enhanced if they provided adequate facilities. The speed in the handling of the case will be further improved and the information required by the community will be presented quickly. But this brings consequences availability of human resources to master information technology. Also coordination between the various elements (sections or sub-sections) in the institutions of law enforcement requires proper coordination and fast so that the information presented is accurate information.

Community participation in the oversight of the workings of the criminal justice system can be a burden as well as grace. Being a burden, which means there is no requirement for law enforcement to provide information and accountable for the truth of the information, and be a boon when public participation can reveal the truth of a matter which is being handled. The challenges currently faced in efforts to improve the performance of law enforcement, especially against opinions that are not pleasant for the performance of the CJS are a matter of professionalism. Law enforcement professionals will certainly produce a quality decision, and

vice versa. On the possibility of protests or complaints from the public about the performance CJS, according to the respondents must proposed through official procedures and fair. Institutions in CJS are open to any criticism and suggestions for improving its performance.

Based on theoretical studies about the legislation that contains the mandate of community participation in criminal justice, among others, can be stated as follows: Law No. 25 of 2004 on the System of National Development Planning Law; 8 of 1981 regarding the Law of Criminal Procedure, Act No. 2 Year 2002 regarding the Police; Law No. 5 Year 2004 jo. Law. 14 Year 1985 on the Supreme Court; Law No. 8 Year 2004 regarding the Attorney General; Law 2 Year 1986 concerning General Court; Law No. 39 Year 1999 on Human Rights; Law No. 28 Year 1999 regarding the provision of a Clean and Free from Corruption, Collusion, and Nepotism; Law Eradication 31 Year 1999 regarding Criminal Acts of Corruption; Law 11 of 2008 on Electronic Information and Transactions, and Law 14 Year 2008 on Disclosure of Public Information, as well as various other legislation which is still in its early stages of identification.

In addition to legislation, research findings also indicate that the operation of CJS is often out of the mainstream settlement of criminal cases. Raharjo Research Agus, et al. (2008) proves this, as well as research from Space, et al. (2007) proved that the criminal justice process has been heavily side, so that victims of crime become victims a second time when the criminal case to proceed in criminal justice. From the research that proves that public participation in oversight of the workings of the CJS is required to escort criminal case nets as well as oversees performance institution law enforcement to prevent misuse authority or powers which may worsen the image of law enforcement in Indonesia.

Criminal justice practices that lead to opportunities to make profits and thus minimize the public to participate caused criminal justice is criminology. This could be prevented by the existence of community participation with the utilization of information technology in the monitoring of the workings of the CJS. Supervision is not only done when the judicial process or in the courtroom, because the potential for corruption or criminology that just outside the courtroom. An independent country (the Police Commission, Commission Attorney,

and the Police Commission) has not been able to reach as a whole against such practices.

Lack of access and lack of information from the hard work of the CJS causes people to get justice, at once difficult to uncover crimes committed by law enforcement officers. Seeing this, the improvement of the performance of the CJS cannot be done without community empowerment. Empowering communities is an effort to improve the performance of the CJS absolutely necessary. Empowerment is a force to be able to access to resources so that there is a power-sharing that can enhance public awareness of its existence. It is said by Kriesberg (in Priyono & Pranarka, 1996; Puji Rahayu, 2001) that, "Gaining control involves empowerment of the individual on their Lives and fulfilling on their needs in part, as a result of developing competencies, skills and Abilities Necessary to Participate effectively in on their social and political worlds."

Empowerment can only be done through a participatory process considering participation means shift in decision-making power from more powerful to poor, disadvantaged, and less influential groups (Eldridge in Priyono & Pranarka, 1996; Puji Rahayu, 2001). Participation is the practice of justice. Therefore, the understanding of participation as empowerment of the people or empowering people covering the practice of justice and the right to enjoy the fruits of development that may lead to conflict between the parties concerned (Widyaatmadja, 1992; Priyono & Pranarka, 1996).

Kartasasmita (1995) and Priyono and Pranarka, 1996 suggests that empowering people had to be done in three ways. First, create an atmosphere or climate that allows the potential for society to flourish. Secondly, strengthening the potential or power possessed by people with implement concrete steps, accommodating a variety of inputs, providing infrastructure and facilities, both physical and social that can be accessed by people of various layers. Third, in the sense of empowering people to protect and defend the interests of the weak.

Supervision by involving all members of society to the workings of the criminal justice system requires facilities and infrastructure. In this era of information technology, utilization of information technology in the form of computer programs (software) for it is a pressing need that can reach all levels of society.

Observing this, all the potential of existing resources should be utilized to promote public participation in state administration, especially the monitoring of the workings of the criminal justice system. Information technology is said to have brought us to the threshold of the fourth revolution in human thought which is characterized by thinking that without a limit (borderless way of thinking) (Harnad, 2003; Mahayana, 2000; Raharjo, 2008; relied to Jacob, 1986).

In the context Indonesian, the information technology revolution has already responded with the establishment of the Basic Framework of the National Information System (Sisfonas). The vision that wants to be achieved by spreading this concept was the realization Sisfonas information cultured society towards an independent nation, democratic and prosperous within the Unitary State of Republic of Indonesia (Kominfo, 2003).

Information society aspired Sisfonas vision as determined in 2010 that focuses on thinking skills to differentiate human and other creatures as well as the culmination of culture and civilization. If the awareness of unconscious information by all components of the nation, then this nation will rise up to its triumph. With mastery appropriate information, a nation will know who he (Rush, 2003; Kominfo, 2003).

Based on the above, then the initiative to create a community information becomes urgent needs that need to be realized. The main focus of the entire nation must be concentrated on the movement of information. Utilization of information technology in an effort to increase public participation in oversight of the workings of the criminal justice system, which takes place on the information society Sisfonas aiming in vision, is something that needs to be realized.

Information technology is one resource that can be used to it. The government has set the empowerment of information technology towards the realization of civilized society of information. If the awareness of unconscious information by all components of this nation, then this nation will rise up to its triumph. Based on the above, then the initiative to create a community information becomes urgent needs that need to be realized.

Based on the above, then formulated a model of public participation in oversight of the workings of the criminal justice system by utilizing information technology. The model was later not only is the feedback or feedback to

the institutions of criminal justice in which case the process is running, but once connected to the commission countries associated with the oversight of the workings of the CJS. This model gives space to the community to participate through providing information about the workings of a criminal case or law enforcement officials so that public involvement in law enforcement rather than be a mere utopia. Because information technology is used in this case, the participation of the community can work across institutional boundaries are monitored, so that the constraints of distance, time and cost can be overcome. If the problem can be overcome, then the CJS and the performance improvement community needs will be public information about cases that were completed or the performance of its officials into a demand for improved professionalism.

4.3 Model Public Participation in the Monitoring of Criminal Justice System Works in Central Java

The following will present the model of community participation in the oversight of the workings of the criminal justice system. Definition of the model basically refers to three things: first, the models in terms of examples or role models, something that should be followed, secondly, the model in terms of shape, pattern, design, and Third, the model in the sense of reflection or description (abstract) reality. In terms of systems theory, the term model is defined as "artificial" than actual reality, artificial reality (not artificial in the sense of "imitation"), or as we are told by Elias M. Award that, "A model is presentation of real or a planned system."

In connection with this research, this model is able to include two terms, namely as a model (in the sense) "abstract factual/reality" and as a model (in the sense) "abstract ideals". Understanding as a model (in the sense) "abstraction factual/reality" is used in discussions about the current model of community participation. Understanding as a model is to be emulated, and the model in terms of shapes, patterns, designs, used in understanding the concept of design or model of this paper reviews the results of, which are recommended to be realized in oversight of the workings of the criminal justice system at the level of written norms and implementation.

Participation model is based on providing software that is simple and applicable and can

be accessed by anyone. In this model, a series of activities in the handling of a case or a criminal case can coast from beginning to end, from handling the case with the police to release from correctional institutions (in normal circumstances). In circumstances that are not normally, information may be provided by tracking the case through this software on display at their respective law enforcement institutions (the Police and the AGO).

This is a software-based law enforcement agency in the district or city in Central Java (Police Resort), District Court, and correctional institutions (prisons). People who will participate in law enforcement can go to the website desired police station, where the offender did what he did. From the website it can be traced to litigation where the settlement of the case. Of course, if the case was still at the police level, then the matter can only be accessed on the level of policing it, and if the case had reached to court or even had been severed and the perpetrators of crimes have been or are currently serving a sentence, then the case can be traced to a website provided by the courts and correctional institutions. So there is the view on the website depends on input data and the way things are managed by the police, Kejari, courts, and correctional institutions are located in areas where the offender committed the crime or where he was tried and carry out punishment.

People are entitled to input the data is the administrator, operator or programmer who is in law enforcement institutions. This brings the consequences of their respective law enforcement agencies in the region should have the human resources to become the motor up date data, other than the server's willingness course. In summary, description of the website content can be described in the section below.

Police on the website as the frontline law enforcement, contains the identity of the perpetrators of crime (name, address, place of birth date/age, occupation, gender, religion, marital status, and address), they had been committed, the articles which may be imposed or suspect, the evidence found/acquired/obtained, the legal basis for determining the status of the suspect to the offender, the status of prisoners (prisoners of the city, house arrest, or detention in the detention center), the basis for determining custody of suspects, the detention period (from start to end and the extension of detention period), and

submission of the dossier (P-21) to the AGO (the transfer date, subject to surrender and receive the file). At the end of the website view, there is a space of community participation, where the public can participate by providing suggestions, criticisms, or opinions on the handling of the case. Space participation can only be accessed if the people filling the identity column as a form of accountability to the information conveyed. Space participation is linked to the National Police Commission. All information from the public can come in and be monitored by police.

On the website of State Attorney, presented information regarding the identity of the suspect, who carried out the crime, the articles that indictment, the status of the detention of suspects, time and place of delivery or registration of a case to court and can be accessed in full indictment submitted to the court. At the end view the website, there is space community participation, where the public can participate by providing suggestions, criticisms, or opinions on the handling of the case. Space participation can only be accessed if the people filling the identity column as a form of accountability to the information conveyed. Space is linked to participation Commission Attorney. All information from the public can come in and be monitored by the Commission Attorney.



In the District Court website, presented information regarding the identity of the accused, legal counsel who accompanies, an indictment, the composition of judges who adjudicate cases, the defendant's detention status, trial schedule (from the beginning to the end of the trial, including events in each trial), evidence submitted, defendant or defense argument, court decisions, and response to the decision of the court (whether by the prosecutor and defendant). At the end of the website view, there is a community participation, where the public can participate by providing suggestions,

criticisms, or opinions on the handling of the case. Space participation can only be accessed if the people filling the identity column as a form of accountability to the information conveyed. Space participation is linked to the Judicial Commission. All information from the public can come in and be monitored by the Judicial Commission.

On the website Correctional Institution, presented information regarding the identity of prisoners, determining the status of elementary row/start penalty, they had been committed, the articles are violated, time and place of delivery of prisoners from the courts, the health conditions of prisoners (as indicated by physician examination and laboratory), a period of detention, which is being undertaken coaching phase, the implementation of the rights of prisoners, and the time of liberation. At the end of the website view, there is community participation, where the public can participate by providing suggestions, criticisms, or opinions on the handling of the case. Space participation; this can only be accessed if the people filling the identity column as a form of accountability to the information conveyed. Space participation is linked to the Directorate General of Corrections. All information from the public can come in and be monitored by the Directorate General of Corrections. To integrate the presentation of data, the server can be located in the Central Java Regional.

Police collect information from the Police Resort District, District Attorney for the institution in Central Java District Court, the High Court for the District Court, and the Central Java Regional Office of Law and Legislation Central Java to correctional institutions. However, Police Resort, District Court, District Court, and correctional institutions in the district can have a separate server. As a system, then each of these institutions are connected to each other, so if someone is able to get information about a criminal case can directly choose the place or location where the offender was committed or where the trial court or execution of sentence of the court's decision.

Utilization of this model of participation should be supported with the update and accuracy of data which must be maintained and opportunities for anyone to give criticism, suggestions, donations or other information of thought relating to disclosure of any criminal proceedings or other law enforcement. Of

course the security of information systems must also maintained, given the internet (cyberspace) there is no guarantee of security. Protection of data needs to be done and to anticipate risks arising from the presentation of information must be done. The key is in the policy by the holders of information system security decisions and managing websites.

5. Conclusion

Based on the above discussion, we can conclude several things:

1. Various legislation mandates public participation in law enforcement. However there are several factors that inhibit the participation of these communities, namely
 - a. Less open law enforcement institutions in providing information regarding a criminal case, as if facing a criminal case is closed to the outside world;
 - b. Due to lack of openness of law enforcement institutions, causing the general public are reluctant to touch or participate in law enforcement;
 - c. Follow-up of public participation in law enforcement cannot be communicated directly to the public, so that the impression of public participation is ignored; and
 - d. There is no exact formula regarding the participation form that can be used by communities to participate in law enforcement, especially for people who are not directly related to a criminal case.
2. To promote public participation in law enforcement, there must be a change in working culture of each law enforcement. Factors inhibiting participation, as mentioned above need to be solved. This will bring big consequences considering changing the working culture is not so easy. There should be awareness among law enforcement and the community to want to change and make the culture of information as a basis in the administration of justice leads to a clean and authoritative judiciary.
3. One way to increase public participation in oversight of the workings of the criminal justice system is to utilize information technology. Through the provision of software based on the law enforcement agency in the county/city, law enforcement institutions can present the data desired by the community regarding a particular

criminal case. In this software available space for public participation. The community can participate by logging into one of law enforcement institutions, providing advice, opinions, and criticism directed to clarify the settlement, criticism of the performance of law enforcement institutions as well as other forms of participation. Space is connected with the participation of (links) to websites Institutions Supervision provided by the state (e.g. the National Police Commission, Commission Attorney, Judicial Commission, and specifically for the prison to the Directorate of Penitentiary Department of Law and Legislation). This connectedness to community participation Supervision Institutions within the scope of the larger society in participation law enforcement form and improving the image and prestige in the eyes of the law of national and international society.

References

- Ali, A., (2002), *Keterpurukan Hukum di Indonesia (Penyebab dan Solusinya)*, Jakarta: Ghalia Indonesia.
- Angkasa, et al., (2006), “Kedudukan Korban Tindak Pidana dalam Sistem Peradilan Pidana (Kajian tentang Model Perlindungan Hukum Bagi Korban serta Pengembangan Model Pidana dengan Mempertimbangkan Peranan Korban)”, *Laporan Hasil Penelitian Hibah Bersaing XIII/1*, Purwokerto: FH Unsoed.
- Arief, B.N, (1994), *Kebijakan Legislatif Dalam Penanggulangan Hukum Pidana*, Semarang: BP Undip.
- Atmasasmita, R., (1983), *Bunga Rampai Hukum Acara Pidana*, Bandung: Binacipta.
- Cotterrell, R., (Ed.), (2001), *Sociological Perspective on Law, Volume II*, Aldershot: Dartmouth Publishing Company.
- Galanter, M., (1981), “Justice in Many Rooms: Courts, Private Ordering, and Indigenous Law”, *Journal of Legal Pluralism* 19.
- Harnad, S., (2003), “Post-Gutenberg Galaxy: The Fourth Revolution in the Means of Production of Knowledge”, *Public Access Computer System Review* 2(1): 39-53, Retrieved at August 23 from <http://cogprints.org/1580/00/harnad91.postgutenberg.html>.
- Hart, H.L.A., (1972), *The Concept of Law*, London: Oxford University Press.
- Ihromi, T.O., (Ed.), (2003), *Antropologi Hukum Sebuah Bunga Rampai*, Jakarta: Yayasan Obor Indonesia.
- Jacob, T., (1996) *Menuju Teknologi Berperikemanusiaan*, Jakarta: Yayasan Obor Indonesia.
- Kementerian Komunikasi dan Informasi RI, (2003), *SISFONAS 2010, Konsep Pengembangan Sistem Informasi Nasional*, Jakarta.
- Mahayana, D., (2000.), *Menjemput Masa Depan, Futuristik dan Rekayasa Masyarakat Menuju Era Global*, Bandung: Rosda.
- Muladi, (1995), *Kapita Selekta Sistem Peradilan Pidana*, Semarang: BP Undip.
- n.n., (2008), “Mediasi sebagai Basis dalam Penyelesaian Perkara Pidana”, *Jurnal Mimbar Hukum* 20(1), Yogyakarta: FH UGM.
- n.n., (2008), “Model Hibrida Hukum Cyberspace (Studi tentang Model Pengaturan Aktivitas Manusia di Cyberspace dan Pilihan terhadap Model Pengaturan yang Tepat bagi Indonesia)”, Dissertation, Semarang: PDIH Undip.
- n.n., (1996), *Sistem Peradilan Pidana, Perspektif Eksistensialisme dan Abolisionisme*, Bandung: Binacipta.
- n.n., (1994), *Sistem Peradilan Pidana (Peran Penegak Hukum Melawan Kejahatan)*, dalam *Hak Asasi Manusia Dalam Sistem Peradilan Pidana*, Jakarta: Pusat Pelayanan Keadilan dan Pengabdian Hukum UI.
- n.n., (1990), *Black's Law Dictionary*, 6th Ed., St. Paul Minn: West Publishing Co.
- n.n., (1990), “Proyeksi Hukum Pidana Materiil Indonesia Di Masa Mendatang”, “Pidato

- Pengukuhan Jabatan Guru Besar Undip”, Semarang.
- Priyono, O.S. & Pranarka, A.M.W., (1996), *Pemberdayaan, Konsep, Kebijakan dan Implementasi*, Jakarta: CSIS.
- Pujirahayu, E.W., (2001), “Pemberdayaan Masyarakat dalam Mewujudkan Tujuan Hukum (Proses Penegakan Hukum dan Persoalan Keadilan)”, *Pidato Pengukuhan dalam Jabatan Guru Besar Madya dalam Ilmu Hukum Undip*, Semarang.
- Raharjo, A., et al., (2007), “Sistem Peradilan Pidana (Studi tentang Pengembangan Model Penyelesaian Perkara Pidana Melalui Jalur Non Litigasi di Jawa Tengah”, *Laporan Penelitian Hibah Bersaing XV/1*, Purwokerto: FH Unsoed.
- Reksodiputro, M., (1993), “Sistem Peradilan Pidana, Melihat Kepada Kejahatan dan Penegakan Hukum Dalam Batas-batas Toleransi”, *Pidato Pengukuhan Penerimaan Jabatan Guru Besar Tetap Dalam Ilmu Hukum UI*, Jakarta.
- Rusli, A., (Ed.), (2003), *Teknologi Informasi, Pilar Bangsa Indonesia Bangkit*, Jakarta: Kementerian Komunikasi dan Informasi RI.
- Sudarto, (1986), *Hukum dan Hukum Pidana*, Bandung: Alumni.
- Widyaatmadja, Y.P., (1992), “Peranan Partisipasi Rakyat dalam Pembangunan”, in UPKM FE UKSW, *Yang Terdesak yang Berkumpul*, Semarang: Percetakan Satya Wacana.

CEGCS: Chicken Egg Grade Classification System using Computer Algorithm

Tasiransurini Ab. Rahman, Tee Jia Jinq, Marlia Morsin, Muhammad Suhaimi Sulong
Faculty of Electrical & Electronic Engineering (FKEE), Universiti Tun Hussein Onn (UTHM),
Malaysia

Abstract

Chicken egg is a good source of protein and supply several vitamins and minerals for humans. Hence, they must meet strict standard in its quality control. In egg quality control, grading is an important process to determine the quality of egg where in this process, it involve an external and internal classification. In egg classification process, it is more focusing on the internal grading. However, there is also a need to focus on the external grading process where for the purpose of sales, chicken egg is graded by its size. Therefore, due to an increase in the need for low cost sorting systems that are reliable and effective to grade eggs according to their size, the Chicken Egg Grade Classification System using Computer Algorithm (CEGCS) has been developed to focus on the external aspect that able to recognize chicken egg's grade using MATLAB software. To get the representation of a given size of egg, Freeman Chain Coding (FCC) algorithm is implemented. The recognition is based on the feature extracted from shape numbers, area, perimeter, diameter, and centroid. Then, the supervised Back-Propagation Neural Network (BPNN) technique had been applied in the system to classify the grade of chicken egg. The result indicates that CEGCS has successfully classified the egg's grade accordingly by 98%. For conclusion, this system is able to recognize and classify the chicken egg's grade successfully.

Keywords: chicken egg, Freeman Chain Coding (FCC), shape number, Back-Propagation Neural Network (BPNN)

1. Introduction

Chicken egg is the most commonly eaten egg, which contains natural balance of essential nutrients. In egg's grading process, egg need to be examined for internal and external qualities and sorted according to its size before selling to the consumers. The egg's internal grading involves the evaluation of yolk, albumen and air space contain in an egg. Meanwhile, external grading involves the inspection for cleanliness, texture, strength, and shape.

However, the development of classification technology is always forcing on the interior checking only. Nowadays, there are many small-scale egg packing centers still mainly use human energies to grade and sort the egg. The egg grading results that performed by human energies are more prone to error since it may depend on the workers' fatigue and subjective decision. In order to improve the efficiency in sorting and grading process, there is necessary to develop an exterior checking technology for supporting the visual quality checks.

Thus, this Chicken Egg Grade Classification System using Computer Algorithm (CEGCS) aims to introduce the image processing technique in chicken egg's grade classification process. With this aim, a chicken egg's grade classification system is designed to recognize

the grades of chicken egg where the image of chicken egg is captured by camera and graded in the designed system. The grade of chicken egg is depending on the parameters, which are the shape number, perimeter, centroid, and area of the chicken egg. Then, chicken egg's grade is classified by using Back-Propagation Neural Network (BPNN) algorithm. Besides that, in order to make the system easy to use, it also provides with Graphical User Interface (GUI) as a communication medium between the system and the user. Hence, this CEGCS is able to reduce the error done by human during grading process and able to increase the production efficiency. Besides, it provides an easy and cheaper way in chicken egg grading process.

2. Digital Image Processing

Digital image processing is the use of computer algorithms to perform image processing on digital images. It allows one to enhance image features of interest while attenuating detail irrelevant to a given application and then extract useful information about the scene from the enhanced image. With the fast computers and signal processors available in the 2000s, digital image processing has become the most common form of image

processing, and is generally used because it is most versatile method and more cheap.

2.1 Freeman Chain Coding (FCC)

Freeman Chain Code (FCC) is one of the simplest image representation ways in computer vision that was introduced by Freeman in 1960s. The basic idea of chain code is to store the relative position between consecutive pixels in an image. The chain codes that are assigned to an image can be in 4-ways and 8-ways connectivity as shown in Fig.1 where the chain codes is a set of integer which assigned to the different direction. For example, the direction north will be represented by the integer zero. This code follows the boundary in counter clockwise manner and keeps track of the direction as it goes from one contour pixel to the next (Mark & Alberto, 2002). Different direction of connectivity will give different length of the code.

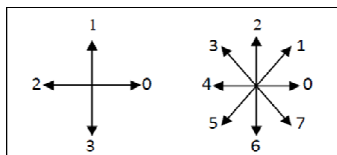


Figure 1. Connectivity Direction of FCC, (a) 4-way, (b) 8-way

The main advantage of the chain code is their simplicity and as such they remain a popular technique for shape description. For example, in 2005, Yue Lu and Chew Lim Tan had applied FCC to digital image to generate area Voronoi diagram. It shows that FCC is a fast implementation algorithm for image representation. Chain codes provide a very compact region representation, suitable for detecting such feature of a region as sharp corners, area, perimeter, moments, centre, eccentricity, projection, and straight-line segments. When using the chain code to process an image, its input is common to have binary image, which is normally displayed as black and white (Lili & Habibolah, 2008).

3. Methodology

There are three important phases for CEGCS, which are image pre-processing, feature extraction and image classification.

3.1 Image Pre-processing

The pre-processing involves filtering and converting the egg's image to binary image. The process for image pre-processing is shown in Fig. 2. The egg's image is captured by using a camera in Red-Green-Blue (RGB) format. The chicken eggs' images are saved and resized in 240x320 pixels. Then, the image is converted to greyscale and filtered by using median filtering. Median filtering is used to eliminate noisy pixels that differ significantly from other pixels in its neighbourhood. The filtered image is then converted to binary image with pixel values of '0' or '1'.

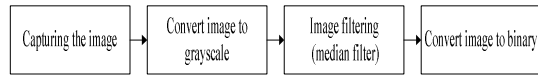


Figure 2. Block Diagram for Image Re-processing Phase in CEGCS

3.2 Feature Extraction

In this CEGCS, the shape number is a major parameter to classify the grade of chicken egg where in this CEGCS, only grade A and grade B are considered to be classified. Besides that, the centroid, area, and perimeter are also take into consideration as parameters to classify the chicken egg.

Shape number can be generated from FCC algorithm. First difference of the chain code reflects spatial relationships between boundary segments, which are independent of rotation. It can be applied to circumvent the rotation problem. The difference is computed by counting in a counter-clockwise the number of directions that separate two adjacent elements in a code. Shape number of a boundary is defined as the first difference of the smallest magnitude. Fig. 3 shows the example of chain code on an chicken egg. The chain code from the figure is 55565666777001112232333. From the chain code, the shape number can be found by applied the first difference technique where shape number is 60017100100101001017100.

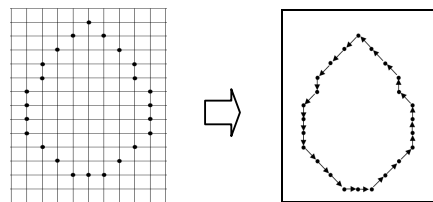


Figure 3. A chicken Egg's Image Represented by Chain Code

The second parameter is from the centroid (center of mass) of the object. It is a balance point (x,y) of an object where there is equal mass above, below, left and right. The way to estimate the shape centroid is as the average values of the shape points' coordinates. The algorithm in Fig. 4 is used to find the centroid of the chicken egg.

The third parameter is perimeter where it is the arc length of a spatially sampled curve, which can be estimated. Since the image of egg is in binary image, thus, the simplest approach can be used to estimate its perimeter. The algorithm in Fig.5 is used to find the perimeter of the egg.

The fourth parameter is from its area. The simplest approach to estimate the area of an object is to count the number of pixels representing that shape. By assuming a binary image is g, the shape pixels is represented by g (p, q) = 1 and g (p, q) = 0 for the background. The algorithm in Fig.6 is used to find the area of chicken egg.

```

1.0 centroid_p = 0
2.0 centroid_q = 0
3.0 area = 0
4.0 For p=1 to P do
  4.1 For q=1 to Q do
    4.1.1 If (q(p, q) = 1)
      4.1.2 centroid_p = centroid_p + p
      4.1.3 centroid_q = centroid_q + q
      4.1.4 area = area + 1
    4.1.5 end
  4.2 end
5.0 end
6.0 centroid_p = centroid_p/area
7.0 centroid_q = centroid_q/area

```

Figure 4. Algorithm of Region-based Centroid Estimation

```

1. Read the input binary image.
2. Apply the binary image thresholding algorithm.
3. Perimeter is equal to the number of edge points detected in step.

```

Figure 5. Algorithm of Region-based Perimeter

```

1. Area= 0
2. For p=1 to Max_P do
3. For q=1 to Max_Q do
4. Area = area + g(p, g)

```

Figure 6. Algorithm of Region-based Simple Area Estimation

3.3 Image Classification

The BPNN is used and trained as the classifier in the system. There are four inputs in of the BPNN, which are shape number, perimeter, centroid and area. The output of the system is only one either grade A or grade B of chicken egg. The BPNN could have zero or more hidden layers. The number of hidden layers and how many neurons in each hidden layer cannot be well defined in advance, and could change per network configuration and type of data. In general, the addition of a hidden layer could allow the network to learn more complex patterns, but at the same time decreases its performance (Baxes, 1994). The Fig. 7 shows the BPNN that is used in CEGCS.

The neural network toolbox in MATLAB provides an easy way to create the back-propagation neural network without involved the complex mathematic equation. For pattern recognition problem, there are two sets data that are required to train the network. They are input vector and target vector which both are arranged in the columns in a matrix. Those two vectors are consisting of the parameters of eggs' data. However, the target vector has an extra parameter which is call scalar target value. The scalar vector value indicates the grade to which the input vectors are assigned. There are generally four steps in the training process which are assemble the training data, create the network object, train the network and simulate the network response to new inputs.(Luciano, 2000).

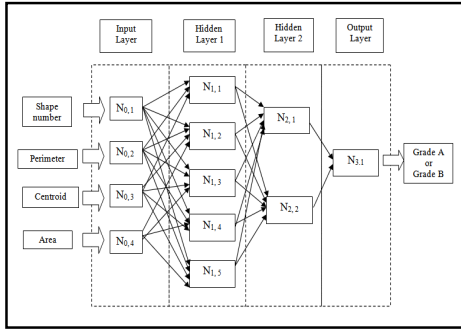


Figure 7. Structure of BPNN

4. Result

All the measurement results are in pixel unit. There are two chicken eggs' grades, which are grade A and grade B eggs are classed by the CEGCS. All the parameter measurement is done in the binary image. MATLAB only recognizes the white color in the image as the foreground object meanwhile the black color is recognized as a background of an image.

4.1 Shape Number

Shape number represents the shape of chicken egg in MATLAB. The trend of shape number for both types of chicken eggs is same due to the chicken eggs' shapes are almost equal. However, grade A is always has longer length of shape number than grade B. Results show that the shape number for grade A is always greater than 500 lengths of numbers meanwhile shape number for grade B is between 460 to 500 lengths of numbers.

4.2 Centroid, Perimeter, Area

As shown in Fig. 8 and Fig.9, the range of centroids for grade A eggs are around 150 to 165 for x-centroid and 119 to 125 for y-centroid. For the grade B eggs, the centroids are around 150 to 160 for x-centroid and 116 to 125 for y-centroid. The centroids of chicken eggs depend on the area of the chicken egg's image. In order to obtain more accurate result, the position of the camera must be fixed during image capturing. In overall, the differences in the centroids between both types of chicken eggs are not too significant.

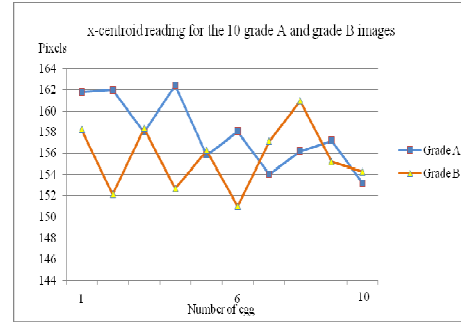


Figure 8. The Graph of x-centroid Reading for the 10 Grade A and Grade B Images

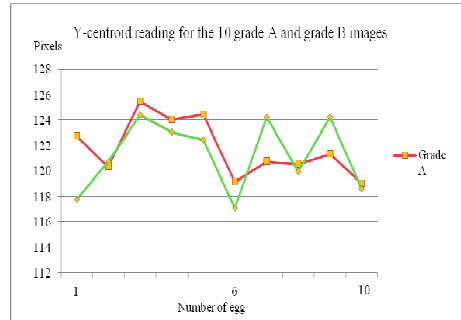


Figure 9. The Graph of y-centroid Reading for the 10 Grade A and Grade B Images

In 8-ways connectivity, the distance between consecutive pixels is $\sqrt{2}$ if the pixels are diagonal neighbor, and '1' otherwise. Therefore, each even number in the chain code contributes '1' pixel arc length and each odd number in the chain code contributes $\sqrt{2}$ pixel arc length. By summing all of them, the perimeter of the binary egg's image is obtained. The average perimeter for grade A is 590.6 pixels meanwhile for grade B is 552.937 pixels. The perimeter of grade A is larger than grade B due to its size.

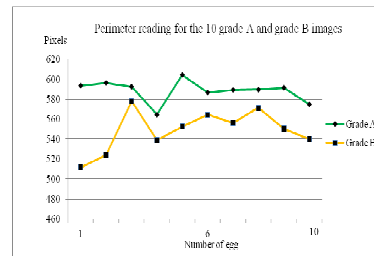


Figure 10. The Graph of Perimeter Readings for the 10 Grade A and Grade B Images

Area is the total object's pixels in the image. As shown in Fig.4, the average area of

grade A is 23977.76 pixels meanwhile average area of the grade B is 21471.74 pixels. The difference of the size between these two grades is about 2500 pixels. The area of chicken eggs is totally depending on the image dimension used. If the image dimension changes to 480 x 640 pixels, the area will be doubled. There is an advantage when the difference of the area between two grades of chicken eggs is large, the system will be easier to determine the grade for the chicken egg.

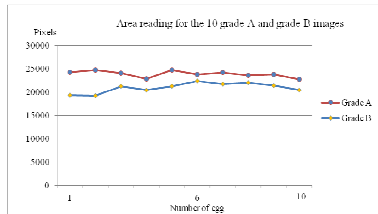


Figure 11. The Graph of Area Readings for the 10 Grade A and Grade B Images

4.3 Back Propagation Neural Network (BPNN)

In MATLAB, BPNN is created by using neural network toolbox. There two sets of chicken eggs' data need to be used in order to class the chicken egg's grade. Both chicken eggs data sets are saved in the excel file. The first set of chicken eggs' data is called as target vector and the second set of eggs' data is called as input vector. Both vectors are used to train the neural network. The target vectors indicate the classes to which the input vectors are assigned. It has six types of chicken eggs' parameters and stored in difference column. The chicken eggs' data are consisted of grade A and grade B eggs. In the target vectors, the scalar target value is the number to assign a grade for the chicken egg. In this case, the number '0' is assigned to the grade A and number '1' for the grade B. When the user presents a new chicken egg's image to the CEGCS, the chicken egg's data will be recorded in an excel file which is the input vectors. The input vectors do not include the scalar target value. During classification process, the target vector input vectors will load into the neural network. The network is trained and at the end of process, a finite number is generated. The finite number is used to compare with the scalar target value. If the finite number is near to '0', the result is grade A, otherwise, the result is grade B. There

are 100 chicken eggs' images have been used to train the network.

4.4 CEGCS Performance

The CEGCS was tested by presented another fifty of grade A and grade B images. Initially, there are 98% of the images being graded by CEGCS successfully. By adjusting the number of neuron in the hidden layer, the CEGCS finally recognized the grades for all images. The efficiency of the CEGCS can be increased by increasing the number of neuron and epoch in the hidden layer. However, this will increase the timing process. The average time taken for the system to grade the chicken egg is around six seconds. The time is reduced by decrease the number of neuron and epoch and in the same time the system performance still in satisfaction condition. Hence, the main advantage of the CEGCS is it is adjustable for the user to get the desired outputs.

5. Conclusion

The CEGCS has been developed by using MATLAB software, which able to determine the chicken eggs' shape number, centroid, area, and perimeter. The BPNN had been trained and able to recognize the chicken egg's grade with high efficiency. The CEGCS's user interface had been designed where the user can easy determine the chicken eggs' grade through the CEGCS's GUI. The CEGCS will record all the tested chicken eggs' data automatically in excel file. The advantage of using FCC in CEGCS is the chicken eggs can be graded regardless to their positions. The BPNN contributes the main advantage to the CEGCS, which made it adjustable. Furthermore, CEGCS provides a cheaper way to recognize the chicken egg's grade instead of high technology instrument. When the CEGCS does not generate the desired output, it can be adjusted to increase its efficiency. Besides, it is important to ensure the quality of the chicken eggs' image is good so that it will eliminate the external factors, which affect the grading result.

For future usage and work, there are several important parts should be concern. Firstly, the range of chicken egg's grade in Malaysia is different compared to others country. For example, in Canada, the chicken egg are weighed and sorted according to sized category such as Jumbo, Extra Large, Medium, Small, and Peewee size. If the system needs to be universalized, then the range of chicken egg's

grade should be standardizing. Besides that, enormous number of chicken egg need to be sampled and trained in this system and the image need to be collected from around the world so that enough information is gathered to do the classification process using BPNN and make the CEGCS is able to be used in every country. Beside that, the system can be improve and upgrade by designing the system that can run in the real time. The system should be provide with the Charge Couple Device (CCD) camera and able to load the image directly into the system. Furthermore, by having conveyer hardware to move the egg around makes the system complete to be applied at poultry farm.

References

Alasdair, M., (2005), *Introduction to Digital Image Processing with MATLAB*, USA: Thomson Course Technology.

Baxes, G.A., (1994), *Digital Image Processing Principles and Application*, John Wiley: New York.

Lu, Y. & Tan, C.L., (2005), *Constructing area Voronoi Diagram in document images*, 1-5.

Luciano, D.F.C. & Roberto, M.C.J., (2000), *Shape analysis and classification*, USA: CRC Press LLC.

Mark, S.N. & Alberto, S.A., (2002), *Feature extraction and image processing*, Great Britain: Replika Press Pvt Ltd.

Wulandhari, L.A. & Haron, H., (2008), "The evolution and trend of chain code scheme", *ICGST-GVIP*, ISSN 1687-398X 8 Issue III: 17-23.

The Designing Web Based Media “Active, Creative, Innovative, and Fun” Learning Process

Widyo Nugroho, M. S. Harlina, Irsya Indiwara
Gunadarma University, Indonesia

Abstract

In Government Regulation No.19 year 2005, it is stated that “ Learning process in an educational institution has to be conducted in interactive, inspirational, fun, challenging way, able to motivate the learners to participate actively, and give enough space for initiative, creativity, and independence based on the learners’ aptitude, interest, and physical development”. This development research tried to implement a learning process which fits the Government Regulation No.19 year 2005 web based media. This application is designed by using Joomla and has been visited by more than 19,000 visitors.

Keywords: web based media)

1. Introduction

In the Government Regulation (PP) No 19 Year 2005 Chapter IV Article 19 Verse 1, it is stated that: “ *The learning process in a one-organized educational unit is held in interactive, inspirational, exciting, challenging, motivating learners to participate actively, and to provide adequate space for the initiative, creativity, and independence according to their talents, interests, and physical development, and students’ psychological condition*”. Therefore, in designing and implementing learning, teachers must pay attention to the things consisted in the article, for instance, by solving learning problems using certain media elements that facilitate interactivity and attractiveness so that it motivatse students to master the learning objectives.. With a lesson plan that utilizes an interactive computer, students will increase their motivation in learning, provide feedback directly, gives students the opportunity to determine their own learning speed and can do *self evaluation*.

De Porter et al (2004) states that the learning process will be more effective if it involves sensory activities. This is a modality that consist of audio, visual and kinesthetic which, when optimized can affect concentration and students’ learning (Susanto, 2006) and those modalities are a person’s learning styles (De Porter, 2003:113). Furthermore, Dale in Arsyad (1996:10) estimates that the acquisition of learning outcomes through the senses of view ranges from 75%, through the senses of hearing for 13% and through other senses about 12%. This requires us to design a learning system which

can optimize sense in the learning as described above. In this case the researchers focused on the media as one of the major components of instructional systems, especially the media that accommodate the optimization of view and hear sensory.

The achievement of learning objectives is highly dependent on the learning process, which how to put the various potential learners. Quality of education will be largely determined by the quality of learning. Of the many elements that most strongly determine the quality of learning, one is a learning media.

The rapid development of Computer Information Technology (TIK), has changed the paradigm for integrating TIK in learning. One form of integration of TIK in learning is the development of web-based instructional media. With web-based instructional media, it allow slearners to interact directly (between user and program/computer) during learning process and provide feed back directly on learners' interactions which will be conducted. In addition, by using multimedia we can see abstract things becomes real object without bring or come to a place that is very difficult to reach and requires a very large cost.

2. Main Theory

Learning can be interpreted as changes in knowledge or a person’s behavior which relatively permanent through the process of experience (Woolfolk, 2004). Meanwhile, Slavin (1997) states that learning is a change in an individual that result from experience. Two definitions of this study gives us a description that the process of learning

happens through a process that gives experience to the learners so that it will change the knowledge or behaviors. The shifting in knowledge or attitudes are relatively permanent.

Generally, learning is an activity carried by a teacher so that the student's behavior will move on for the better one. Learning is an effort to create a climate of teachers and service to the capabilities, potentials, interests, talents and needs of students are very diverse in order to create optimal interactions between teachers and students and between students and students.

Law of the Republic of Indonesia No. 20 Year 2003 about National Education System has been passed. In chapter 1 verse 20, it is stated that "learning is the process of interaction between teachers and students in a learning environment". It is asserted that learning can not be separated from the importance of learning resources.

The paradigm shift from 'teacher-centered learning' to 'student-centered learning' has brought up the revolution in learning systems. Teachers are not the only source of information (knowledge) that will be studied by learners, but the teachers have changed their status as a facilitator in learning. So that is needed is education personnel capable of developing and utilizing resources in an optimal learning for the sake of learning.

Miarso (2009) states that development of information and communication technology (TIK) has provided a variety of possibilities for improving quality of education, which are: (1) improving access for achieving the information from any source, (2) improving the effectiveness of communication with various forms of sensory stimulation, (3) improving relevance to the needs of an increasingly numerous and diverse, (4) adjustments to the changing of environmental conditions, and (5) improving the efficiency by saving time, effort and cost.

The importance of TIK in the learning process associated with the preparation of human resources in the era of knowledge-based society. In 2020, Indonesia will enter the era of free trade (AFTA), which at that time, people of Indonesia must have a qualified ICT literacy and the ability for using it to improve productivity. This will be imprinted on the students themselves, as well as improve the

effectiveness and efficiency of the learning process itself.

3. Design, Model, and Implementation

The concept of social community for learning sites had to be visualized to obtain a better understanding of the concept, so that a physical model can be built based on the existing conceptual models

The main theory that is used here is derived from the profile methodology of the e-learning.

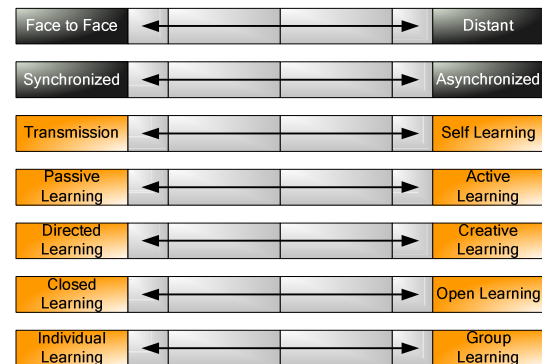


Figure 1. E-Learning Profile Methodology

As can be seen from the figure 1 there are several ways of learning methodologies. The models on the left side is the conventional ways of learning, such as face to face learning and directed learning. But the models on the right is the more intuitive learning methodology like distant learning and open learning.

The social community multimedia e-learning sites is value more on the right, which is the more comprehensive approach but did not deminished the right value which is the more traditional approach. The value on the left is emphasizes on the social interaction jua like the concept of the social community multimedia e-learning sites, but the value on the left is the main concept of learning itself.

The communication on this concept also derived from the time and space dimension of the e-learning.

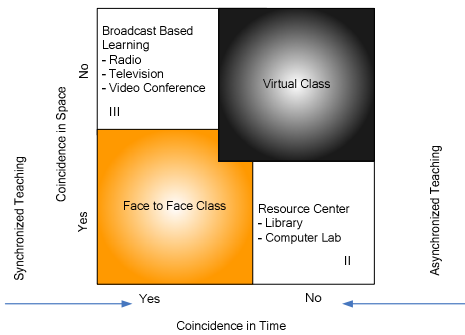


Figure 2. E-Learning Time and Space Dimension

This models resembles the way a social community for learning sites providing means of communication and interaction to its users. The communication is consisting of two different types of communication, the asynchronized models and synchronized models. The asynchronized models is a model which enabled user to communicate without having the other user to participate in the same times, this types of communication can be achieved by using technology such as blogs and wikis or e-mails and forums.

The other way around is the synchronized models, this models is more sophisticated and harder to implement that the asynchronized models. It requires both of the participants to exchange information at the same time. Synchronized models can be achieved by using technologies such as live chat, video conference, and voice conference.

3.1 Conceptual Model

To strengthen the concept of social community multimedia e-learning site, a conceptual model is made. The conceptual model will make the original concept even clearer and more understandable.

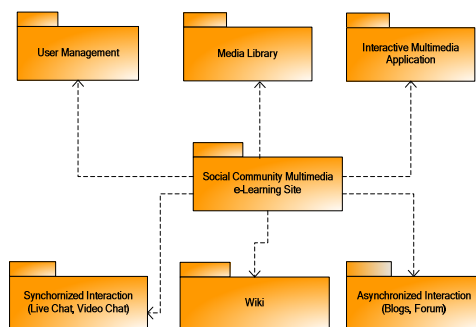


Figure 3. Conceptual Model

The model here is simply to put the sites as a center of activity for the users. The model requires that a social community e-learning sites should have several main components that will support the sites.

- **User Management:** User management is useful in giving the user a profile which they can costumize to provide more personalized user interface and session for the user when using the sites.
- **Media Library:** Media library is a part of the sites where all the learning media is stored and might be available for downloads. Because the sites is emphasized in interaction and knowledge sharing, users can also create their very own learning content.
- **Interactive Multimedia Application:** This application will be embeded inside the sites to provide the users with an application that would help the learners to learn the subject. Multimedia contents enable the site to deliver much more convenient ways of learning to the users.
- **Synchronized Interaction:** This interaction provide the users with real-time interaction with each user in the sites. This interaction requires each user to be online at the same time.
- **Wiki:** This concept is using the already proven online encyclopedia, wiki. Using its costumize device wiki engine the user can get a content and post a content within the internal wiki engine sites.
- **Asynchronized Interaction:** This type of interaction will provide the sites with one way interaction capability. Users can interact with other users despite the other users are not online at that time.

3.2 Design and Used Technology, the Designing of Web-Based Media, and the Designing of Navigation Structure

Navigation structure used in Elearning.gunadarma.ac.id/~ cai is a non-linear navigation structure, which is the branching structure created on the non linear every position has the same view without the existence of the master page and slave page.

The next step is to create map navigation. Map navigation is a form of the detail of the navigation structure is used. Navigation map on Elearning.gunadarma.ac.id/~ cai can be seen in the image below:

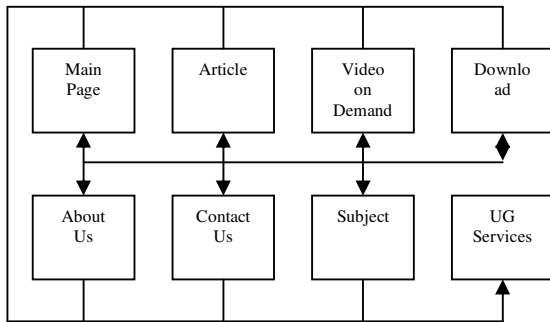


Figure 4. Navigation Structure on Elearning.gunadarma.ac.id/~cai

3.3 Page Designing

In designing the page, it can be seen in the base form from the appearance of Elearning.gunadarma.ac.id/~cai, Start from the main page view, subject pages, page video on

demand, article pages, pages about learning site, and learning site contact page.

4. Implication/Result

Results from the study with thirty respondents all of whom are students of Gunadarma University are presented using descriptive analysis. The four indicators, quality and compatibility of sites, display quality, presentation materials and student interaction will be analyzed first using the frequency distribution table as shown in Table 1 for indicators of quality and compatibility, Table 2 for the display quality indicators, Table 3 for the indicator presentation materials, and Table 4 for user interaction indicator.

Table 1. Frequency Distribution Indicator "A" (Quality and Compatibility)

	Poor		Fair		Neutral		Good		Very Good		Total	
	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid
KK1	1	3,3%	10	33,3%	9	30,0%	7	23,3%	3	10,0%	30	100%
KK2	1	3,3%	4	13,3%	7	23,3%	15	50,0%	3	10,0%	30	100%
KK3			6	20,0%	11	36,7%	11	36,7%	2	6,7%	30	100%
KK4	1	3,3%	3	10,0%	11	36,7%	12	40,0%	3	10,0%	30	100%
KK5			2	6,7%	9	30,0%	14	46,7%	5	16,7%	30	100%
KK6	1	3,3%	4	13,3%	8	26,7%	11	36,7%	6	20,0%	30	100%
KK7			3	10,0%	16	53,3%	9	30,0%	2	6,7%	30	100%
KK8			1	3,3%	12	40,0%	14	46,7%	3	10,0%	30	100%
KK9			3	10,0%	20	66,7%	16	20,0%	1	3,3%	40	100%
KK10	1	3,3%	2	6,7%	22	73,3%	5	16,7%			30	100%
KK11	1	3,3%	1	3,3%	14	46,7%	12	46,7%	2	6,7%	30	107%
KK12			2	6,7%	5	16,7%	21	70,0%	2	6,7%	30	100%
KK13			2	6,7%	9	30,0%	17	56,7%	2	6,7%	30	100%
KK14	1	3,3%	7	23,3%	17	56,7%	5	16,7%			30	100%

Source: Processed data.

Table 2. Descriptive Analysis Indicators "A" (Quality and Compatibility)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
KK1	30	4	1	5	3,03	1,066	1,137
KK2	30	4	1	5	3,50	,974	,948
KK3	30	3	2	5	3,30	,877	,769
KK4	30	4	1	5	3,43	,935	,875
KK5	30	3	2	5	3,73	,828	,685
KK6	30	4	1	5	3,57	1,073	1,151
KK7	30	3	2	5	3,33	,758	,575
KK8	30	3	2	5	3,63	,718	,516
KK9	30	3	2	5	3,17	,648	,420
KK10	30	3	1	4	3,03	,615	,378
KK11	30	4	1	5	3,43	,817	,668
KK12	30	3	2	5	3,77	,679	,461
KK13	30	3	2	5	3,63	,718	,516
KK14	30	3	1	4	2,87	,730	,533
Valid N (listwise)	30						

Source: Processed data.

Table 3. Frequency Distribution Indicator "B" (Display Quality)

	Poor		Fair		Neutral		Good		Very Good		Total	
	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid
KT1	2	6,7%	6	20,0%	11	36,7%	11	36,7%			30	100%
KT2	1	3,3%	2	6,7%	6	20,0%	20	66,7%	1	3,3%	30	100%
KT3	2	6,7%	5	16,7%	8	26,7%	12	40,0%	3	10,0%	30	100%
KT4	1	3,3%	10	33,3%	11	36,7%	7	23,3%	1	3,3%	30	100%
KT5	2	6,7%	7	23,3%	7	23,3%	12	40,0%	2	6,7%	30	100%
KT6			6	20,0%	15	50,0%	8	26,7%	1	3,3%	30	100%
KT7	1	3,3%	5	16,7%	14	46,7%	8	26,7%	2	6,7%	30	100%

Source: Processed data.

Table 4. Descriptive Analysis Indicator "B" (Display Quality)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
KT1	30	3	1	4	3,03	,928	,861
KT2	30	4	1	5	3,60	,814	,662
KT3	30	4	1	5	3,30	1,088	1,183
KT4	30	4	1	5	2,90	,923	,852
KT5	30	4	1	5	3,17	1,085	1,178
KT6	30	3	2	5	3,13	,776	,602
KT7	30	4	1	5	3,17	,913	,833
Valid N (listwise)	30						

Source: Processed data.

On the frequency distribution table we can see the majority of respondents argued that the site performance in terms of quality and compatibility has operated properly. In KK2 variables (ease of access in the browser) as much as 50% of respondents answered either, which means the site can be accessed easily. And in the variable KK12 (presenting information) sites achieved good results with 70% of respondents answered either of these variables. In KK10 variables (web access using Opera) 73.3% neutral opinion, this is because the Opera browser has number of users who are not up to 3% across the world compared to Internet Explorer or Firefox users that have a percentage above 40%. It also has underlied the test sites using the Firefox browser and Internet Explorer. The conclusion that can be drawn from the analysis of quality and compatibility of indicators that the website has had a fairly good quality but there are still shortcomings in compatibility with multiple browsers in circulation.

From the descriptive analysis table, it can be seen that the trend of the indicators of quality and compatibility of the respondent's answer is in the range of neutral and good

answers. This trend can be viewed from the average variable in quality and compatibility of indicators ranged between 2.87 to 3.73 which approximates a good answer scale (4) and neutral (3).

On the frequency distribution table display quality indicators site only mediocre results, at variable KT1 (instructions for use of the site), KT4 (using animation), KT6 (clarity of sound and narration), and KT7 (music is used) between 20.0% up to 50% of respondents answered neutral, which means in terms of viewing the site still needs improvement. In KT2 variable (degree of legibility of text) 66.7% of respondents have a fairly good perception. A conclusion can be drawn from the distribution for the indicator of quality and appearance, the conclusions drawn is the site needs improvements in terms of display on every page and narrative repair.

n descriptive analysis, a similar indicator on the display quality test before going back to the descriptive analysis. The tendency of students to answer on a scale of neutral (3). Can be seen from the average size was 2.90 to 3.60 is obtained which means the tendency of students who answered neutral.

Table 5. Frequency Distribution Indicator “C” (Presentation Materials)

	Poor		Fair		Neutral		Good		Very Good		Total	
	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid
PM1			5	16,7%	8	26,7%	17	56,7%			30	100%
PM2	1	3,3%	5	20,0%	7	43,3%	17	56,7%			30	123%
PM3	1	3,3%	3	10,0%	10	33,3%	14	46,7%	2	6,7%	30	100%
PM4	1	3,3%	3	10,0%	11	36,7%	15	50,0%			30	100%
PM5			3	10,0%	10	33,3%	17	56,7%			30	100%
PM6			3	10,0%	13	43,3%	13	43,3%	1	3,3%	30	100%
PM7			3	10,0%	13	43,3%	13	43,3%	1	3,3%	30	100%
PM8					11	36,7%	15	50,0%	4	13,3%	30	100%

Source: Processed data.

Results from the frequency distribution table shows 43.3% to 56.7% of respondents answered either on each indicator variable presentation of the material. With most of the rest of the respondents 26.7% to 43.3% answered neutral, it indicates that the site performance in terms of presenting the material has performed well. Variable with the

best performance is variable PM1 (clarity of learning goals) and PM2 (clarity of instructions for use modules) of 56.7%. From these results, the site made no material changes from the existing site, there is only the addition of some material that is not yet available.

Table 6. Descriptive Analysis Indicators “C” (Presentation Material)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
PM1	30	2	2	4	3,40	,770	,593
PM2	30	3	1	4	3,33	,884	,782
PM3	30	4	1	5	3,43	,898	,806
PM4	30	3	1	4	3,33	,802	,644
PM5	30	2	2	4	3,47	,681	,464
PM6	30	3	2	5	3,40	,724	,524
PM7	30	3	2	5	3,40	,724	,524
PM8	30	2	3	5	3,77	,679	,461
Valid N (listwise)	30						

Source: Processed data.

Results Descriptive analysis of the presentation of material on the indicator shows that the tendency of the respondents answered neutral (3) and good (4), with the trend more in the good answers. It is described by an average of respondents' answers on each

indicator variable in the presentation of material ranging from 3.33 to 3.77. It is concluded according to the data descriptive analysis and frequency distribution of that material contained on the site already has performed well.

Table 7. Frequency Distribution Indicator “D” (User Interaction)

	Poor		Fair		Neutral		Good		Very Good		Total	
	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid	F	% Valid
IP1	1	3,3%	3	10,0%	10	33,3%	11	36,7%	5	16,7%	30	100%
IP2			6	20,0%	9	30,0%	13	43,3%	2	6,7%	30	100%
IP3			3	10,0%	7	23,3%	18	60,0%	2	6,7%	30	100%
IP4			1	3,3%	12	40,0%	15	50,0%	2	6,7%	30	100%
IP5			4	13,3%	12	40,0%	12	40,0%	2	6,7%	30	100%
IP6	1	3,3%	7	23,3%	10	33,3%	9	30,0%	3	10,0%	30	100%
IP7	1	3,3%	5	16,7%	13	43,3%	10	33,3%	1	3,3%	30	100%
IP8			7	23,3%	10	33,3%	11	36,7%	2	6,7%	30	100%
IP9			6	20,0%	11	36,7%	11	36,7%	2	6,7%	30	100%
IP10			5	16,7%	12	40,0%	12	40,0%	1	3,3%	30	100%
IP11	1	3,3%	8	26,7%	8	26,7%	13	43,3%			30	100%
IP12			8	26,7%	9	30,0%	11	30,0%	2	6,7%	30	93%

Source: Processed data.

Frequency distribution table for the user interaction indicator showed 30.0% to 60% of respondents believe both the variables contained in the indicators of user interaction with the remaining 23.3% to 43.3% a neutral opinion. On variables such as IP3 variables (order of appearance) as much as 60% of the opinion that the order of appearance can

already presented well. So also with variable IP4 (menu choice) as much as 50% of respondents believe the site has a menu of options that can function properly. Contrast to the variable IP7 (smart guides) as much as 43.3% of respondents answered neutral, which means the site still requires intelligent guide that can help the user.

Table 8. Descriptive Analysis Indicators “D” (User Interaction)

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
IP1	30	4	1	5	3,53	1,008	1,016
IP2	30	3	2	5	3,37	,890	,792
IP3	30	3	2	5	3,63	,765	,585
IP4	30	3	2	5	3,60	,675	,455
IP5	30	3	2	5	3,40	,814	,662
IP6	30	4	1	5	3,20	1,031	1,062
IP7	30	4	1	5	3,17	,874	,764
IP8	30	3	2	5	3,27	,907	,823
IP9	30	3	2	5	3,30	,877	,769
IP10	30	3	2	5	3,30	,794	,631
IP11	30	3	1	4	3,10	,923	,852
IP12	30	3	2	5	3,23	,935	,875
Valid N (listwise)	30						

Source: Processed data.

The results from Descriptive analysis on user interaction indicator shows that the tendency of the respondents answered neutral (3) and good (4), with the trend more in the good answers. It is described by an average of respondents' answers on each indicator variable in the presentation of material ranging from 3.10 to 3.67. It is concluded according to the data descriptive analysis and frequency distribution that the site has a display that can interact with users quite well

5. Conclusion

From the results of descriptive analysis on the data obtained from the questionnaire, can be drawn conclusions regarding the performance of the site. Overall site performances have given the expected performance and function. With indicators of quality and compatibility as well as the presentation of the material have given a good performance, but with notes on indicators of quality display and user interaction.

On the indicators of quality and compatibility as well as presentation materials, it has provided satisfactory performance, which can be seen with the tendency of respondents argued both on several variables in the indicators of quality and compatibility as well as a good opinion on almost every indicator variable in the material presentation.

While the indicators of quality display and user interaction, the site showed mediocre performance, with most respondents choose a neutral opinion on almost all of the variables contained in both these indicators.

With these results it can be assumed that the student requires a web-based learning site with the look and user interaction which is better than the previous site but does not change the content of existing sites.

References

- Adams B, Alden J, and Harris N (2006) Regional development and spatial planning in an enlarged European Union. Aldershot: Ashgate.
- Ang L, and Taylor B (2005) Managing customer profitability using portfolio matrices. *Journal of Database Marketing and Customer Strategy Management* 12: 298-304.
- Ballinger A, and Clark M (2001) Nutrition, appetite control and disease. In: Payne-James, J et al. [eds.] *Artificial nutrition support in clinical practice*. 2nd ed. London: Greenwich Medical, pp. 225-239.
- Benoit B (2007) G8 faces impasse on global warming. *Financial Times* 29 May 2007, p. 9.

European Commission (2004) First report on the implementation of the internal market strategy 2003-2006. Luxembourg: Office for Official Publications of the European Communities.

Fledelius H C (2000) Myopia and significant visual impairment: global aspects. In: Lin L L-K, Shih Y-F, and Hung P T [eds.] Myopia Updates II: Proceedings of the 7th International Conference on Myopia. Taipei, 17-20 November, 1998. Tokyo: Springer, pp. 31-37.

Garcia-Sierra A (2000) An investigation into electronic commerce potential of small to

medium-sized enterprises. PhD Thesis, Cardiff University.

Thompson B (2006) Why the net should stay neutral [Online]. Available at: <http://news.bbc.co.uk/1/hi/technology/4594498> [Accessed: 10 May 2007].

Kyle L. Peck, Michael J. Hannafin (1988) The design, Development, and Evaluation of Instructional software. Macmillan Publishing company,

Stanley R. Trollip and Stephen M. Alessi, Computer – based Instruction methods and development, (1991), Prentice Hall, Englewood Cliffs, New Jersey.

The Designing of Computer-Based Information and Communication Media for Improving the Performance of Hajj and Umroh Travel Agents

Widyo Nugroho, Ruzi Erlinda, Irsya Indiwara
Gunadarma University, Depok, Indonesia

Abstract

The training (manasik) of Hajj/Umroh pilgrim is one the non-formal school education which often held in several Hajj Training Institution and Tourism Agents. Based on the observation, this activity is still done merely as a ceremonial without concerning the learning matter. This research tries to develop the learning media by taking notice in learners' characteristics to stabilize the learners' motivation, beside as the promotion form company's marketing

Keywords: designing of computer based information

1. Introduction

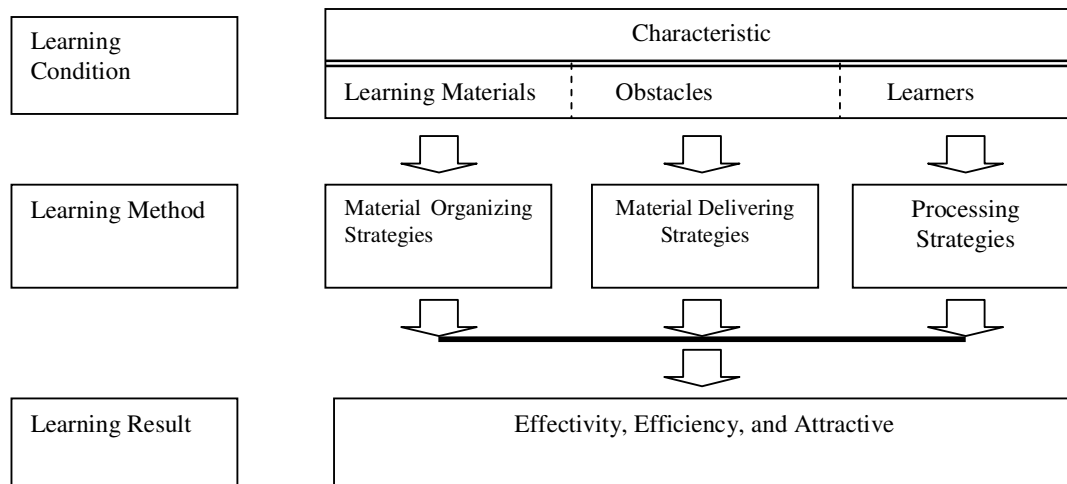
Manasik means "the etiquette in worship". Manasik of Hajj / Umroh is an activity which is undergone by the Hajj/Umroh conselling agencies or travel agents that provide the service for Hajj/Umroh pilgrimage which focusses for guiding the procedure for Hajj/Umroh. Kegiatan itu bisa dikatakan juga Workshop atau pelatihan untuk melaksanakan ibadah haji/umroh. As we have awared, in Indonesia, the cost for Hajj travel is still considered as an expensive one so that not all the pilgrims are able to repeat it more than once. Therefore, Hajj Pilgrim should be undergone in the correct ways in order to achieve a succesfull Hajj (mabrur).

Based on the observation, manasik has not been delivered appropriately to all the Hajj pilgrimage. Apparently, manasik only appears as a merely ceremonial before doing a Hajj pilgrim, without concerning its contents widely.

2. Main Theory

Haji/umroh Manasik can be defined as a learning process. The study about learning process is related with the learning strategy. In the concept of education technology, the term *instruction* is distinguished with *teaching*. Instruction is an effort for processing a specific environment so that a person would able to construct his/her positive side. Meanwhile, *Teaching* is an attempt for guiding and directing the learning experiences to the learners which is mostly be done in a formal situation.

Instruction and Teaching are both considered as a science and art. A teacher should master both elements in the equal capacity and also able for implementin them in the learning process. A good learning program should meet several requirements such as: *attraction, effectivity* and *efficiency*. Reigeluth dan Merrill (1983) conclude that an instruction should be based on the perspective theory, which is a theoty that gives a "formula" for learning problems. That theory should also consider three variables which are: *condition, method* and *result*. The construction of that theory can be described as below:



Graph 1. The Construction of Learning Theory (adapted from Reigeluth, *Instructional-Design Theories and Models: An Overview of their Current Status*, 1983:18)

The learners' characteristic cover their daily life style, social-economim condition, reading skill, and so forth. The characteristics of materials covel the aims and goals from that process, and also the obstacles. For instance, the weakness for reading and memorizing arabic prayes during the pilgrim. Material organizing covers how to design materials for an independent learning's puposes. Delivering strategies include the consideration of using the media to choose what, how, who in the scope od material delivering. Meanwhile the processing activities include the decision for developing and processing the materials and delivering strategies.

Information technology has grown so rapidly nowadays. This development influeces our lifes globally in the field of application. Tofler describes that development as three major stages. The first stage appeared in the the form of cultivation technology, which had been starting for over thousands years ago. Yet, there are still a lot of people who have not taken an advantage on it.

The third stage is a grand revolution of electronic and information technology, which has taken place in the past couple of years. Basically, this development has several features such as: (1) upgrading the capacity for saving, manipulating, and giving information, (2) the improving of the rapidity in giving information (3) miniaturization the hardware and its availability, (4) the diversity of choice for serving needs, (5) minimalizing the information cost, (6) the easiness of using the information-technology products, either

hardwares or softwares, (7) the spreading of information distribution by permeaging the geographic, politic, and even sovereignty borders, (8) improving the usefulness of information the varieties for the better serving and more accurate future prediction.

The utilization of information technology in manasik instruction is manifested by developing the compiter based instruction. *Computer Based Education* had been initiated in the 60's , since the first *Computer-Based Instruction* was developed. *Computer Based Instruction* (CBI) is a form of computer application used in learning process. The practice of CBE in other fields such as *Computer-Managed Instruction (CMI)*, *Computer-Assisted Testing*, and *Computer-Assisted Guidance*. Meantime, the programs used for CBI covering: *Computer-Assisted Instruction (CAI)* and *Computer-Assisted Learning (CAL)*. The implementation of both programs is used as a tutor which plays a instruction role in the same term.

Hannafin dan Peck classify CAI programs 4 models, which are: (1) *drill and practice*, (2) *tutorials*, (3) *simulations*, dan (4) *instructional games*. These CAI programs accord with the classification done by Budiarjo, which states that the attractive CAI applications consist of: (1) *latih dan praktek* (drill and practice), (2) *penjelasan* (tutorial), (3) *simulasi* (simulations), and (4) *permainan* (games). Lockard et.al. state that several CAI formats that has been used until now , comprise: (1) *drill and practice*, (2) *tutorials*, (3) *simulations*, (4) *instructional games*, and (5)

problem solving. Meanwhile, according to Soulier, CAI programs can be classified into 6 strategies, which are: (1) *tutorials*, (2) *drill and practice*, (3) *simulations*, (4) *problem solving*, (5) *discovery laboratory*, and (6) *games*. Among those four explanation, we may conclude that the importance for classifying CAI program are to determine the strategy used for achieving the learning strategy and how the materials will be delivered by the computer.

3. Modeling, Implementation Design

The Developing of Procedure Models in Computer Based Instruction covers three stages, which are:

a. Needs Assessment Stage

The aim of this stage is to identify the specification of factual needs of a program development. In this stage, the designers develop the understanding which is related to (a) students' needs for the developing programs, (b) the environment which the programs are going to be used, (c) the obstacles in the programs, (d) general and specific goals, and (e) the assessment point that used for determining the criteria of CAI programs in objective ways. The designers identify the skill and competency that the pilgrims will achieve during the manasik program.

b. Designing Stage

The aim in this stage is to identify the main goals from the results that are going to be achieved in the CAI programs. Furthermore, the goals are compiled into the goals sequence orderly. In this stage, the designers create aims list, assessment points, and description of activities for achieving the goals, which later is being transfered into storyboard. Storyboard is an illustration which describes every shift in the monitor and gives the information for both observer and programmer.

c. Developing and Implementing Stage

In this stage, the materials of CAI programs that still in the *blueprint* form is transferred in computer programs for achieving the expected manasik goals. The activities in this stage cover: the designing of flow chart, writing the computer programs, testing and debugging, collecting the materials procedure, summative evaluation, formative evaluation, and revision. The result in this stage is CAI materials in the form of computer programs for achieving the expected general and specific aims

3.1 Stages in Developing

The development of is clearly defined in the following diagram.

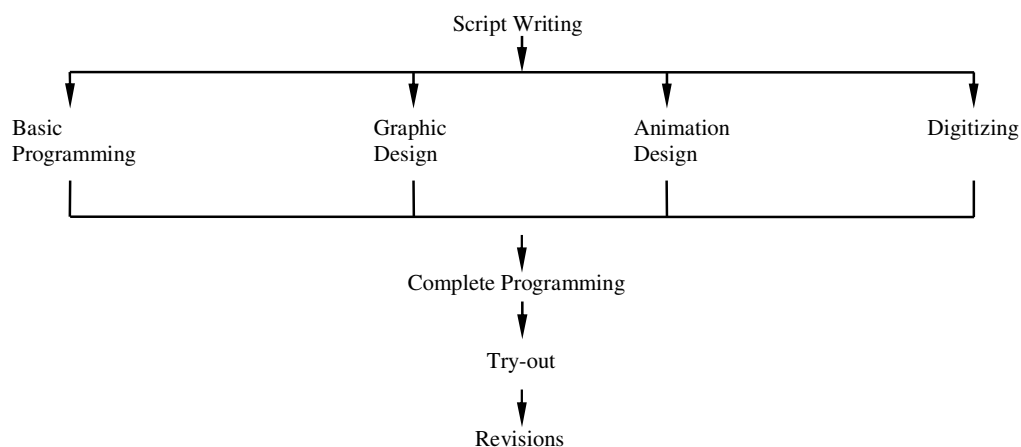


Diagram 1. Steps in Designing Program Development

The main software used in the design program is Macromedia Authware 6.0 and other supporting software FlashMx, Adobe Photoshop 7.0. Adobe Premier 6.5 used to present pictures and animations.

Quicktime 5.0 is a visual software player in the format of film or video and Cool Edit 2000, used to edit audio/sound.

Assessment of program properness is conducted by the experts of language learning and the experts of media. The assessment will

produce qualitative data in the forms of responds, suggestion and criticism which will be used as basis in the program improvement. Also, from Likert scale questionnaire, quantitative data can be attained which will analyzed further descriptively.

4. Research Result discussion

4.1 Try-out of the Program

Try out held in several mosques which have already done and will do the Umroh worship.

Table 1. Students' Response on the Performance Quality of the Program

No.	Statements	Average Scores	Median Scores in Likert Scale
1	Clarity of the instructions	3.0	2.5
2	Text readability	2.9	2.5
3	Quality of the pictures	2.7	2.5
4	Animation	2.6	2.5
5	Colour compositions	2.8	2.5
6	Clarity of the noise or narrations	3.1	2.5
7	Supporting music	2.5	2.5
	Average	2.8	2.5

In general, the presentation of the materials also got the 2.8 or very good (Table 2). Although all aspects of the materials presentations are said to be very good, the researchers need to pay attentions to the feedback made by students in each exercises. Some of the students propose that a feedback

Based on the responses of the pilgrims, it is identified that from the quality point of view the average score is 2.8 (Table 1). This score is in the above or in the right position of median in Likert Scale. So, it can be said that the quality of the program is good. Meanwhile, among other aspects, the clarity of the instructions, and the clarity of the voice or narration got the highest score.

should be given right away for each wrong answers, and not at the end of exercises. Hence, students can make immediate corrections for the mistakes made. Certainly, this should be considered as a very good idea for the improvement of the future program design.

Table 2. Students' Response on the Material Presentations

No.	Statements	Average Scores	Median Scores in Likert Scale
1	The clarity of the aims of the study	3.1	2.5
2	The existence of learning clues	2.8	2.5
3	The understandability of the sentence	2.7	2.5
4	The understandability of the program	2.8	2.5
5	The accuracy of the performance	2.7	2.5
6	The appropriateness of exercises	2.7	2.5
7	The clarity of feedback or response	2.6	2.5
8	The availability of "Help"	2.8	2.5
	Average	2.8	2.5

Table 3. Students' Response on the User Interactive Point of View

No.	Statements	Average Scores	Median Scores in Likert Scale
9	CALL is easily and independently operated	2.7	2.5
10	You frequently use CALL	3.1	2.5
11	The order can be forward and backward	2.8	2.5
12	There are various choices of menu	3.5	2.5
13	It has "Help" that can be accessed any time	3.1	2.5
14	The user may exit and start the program any time	3.1	2.5
	Average	3.5	2.5

An evaluation to the user interactive point of view is done to identify whether or not the

program has a program operating system that is easy and more interesting for the students to

learn more active through various interactive strategies. In general, the aspect of this feature

is responded to be good with the average score 3.5.

Table 4. Students' Response on the Program Interactions

No.	Statements	Average Scores	Median Scores in Likert Scale
15	Each topic is completed with the exercises for the evaluation	3.1	2.5
16	This program provides scores of the formative test	3.1	2.5
17	The feedback to the response of the user	3.1	2.5
18	If the answer is wrong, the right answer will be provided	2.9	2.5
19	Materials can be repeated anytime to improve memory skill	3.1	2.5
20	Program is able to provide display alternative/branch.	2.9	2.5
	Average	3.3	2.5

Evaluation of program interactive aspect has an objective to know whether or not CALL program has proper stimulus interactive system given by students with the responds displayed by computer. So, students are motivated to attend the class lecturing. Table 4 shows that this aspect average score is 3.3. The score is in the above or at the right position of Likert scale median score. In general, this aspect is good.

5. Conclusions and Suggestions

1. The content of the program is designed in accordance with the syllabus of the English course in Gunadarma University. Therefore this program can be used as complement or supporting module in learning structure.
2. Based on the try-out conducted to the students of System Information Department, it shows that 96% of the samples recommend that this program to be implemented in the teaching learning process.

5.1 Conclusion

From the descriptions above, we may conclude that education management is an activity which correlates learning, changing, and innovation. The term of knowledge management (KM) appeared due to the technology which enables people for recording, in the written or picture forms. The implementation of knowledge management in the Manasik Hajj is used for developing the computer based instruction which later is known as "Hajj/ Umroh Manasik Computer Programs"

References

Barbara B.Seels Rita C.Richey. Instructional Technologi The Definition and Domain of the Field. Association for Educational Communication and Technologi, Washington DC, 1994.

Conny R.Semiawan, Pendidikan Tinggi Peningkatan Kemampuan Manusia Sepanjang Hayat Seoptimal Mungkin Jakarta: DIRJEN DIKTI, 1998

Hannafin dan Peck. The Design, Development, and Evaluation of Instructional Software New York: Macmillan Publising Company, 1988

Kemp, J.E. dan Dayton, D.K. Planning and Producing Instructional Media.

Cambridge: Harper & Row Publishers, New York. 1985

Meier, Dave. The Accelerated Learning Handbook. Bandung KAIFA. Januari 2002.

Salomon. Interaction of Media, Cognition, and Learning. San Fransisco, CA: Jossey- Bass, 1977.

Simonson dan Thomson. Educational Computing Foundation. Columbus: Merrill, 1994

Stephen, M. Allensi dan Stanley R Trolip, Computer Based Instructional Method and Development, New Jersey, Prentice Hall, 1991.

Validation of Dimensions in the Factors of Usability, Interactivity, and Trust as the Indicators of Web Experience in Online Marketing

Luhur Budiansyah

Alumnus of Graduate School of Communication Science, University of Indonesia (UI); Marketing Strategist, PT. Anta Express Tour & Travel Service Tbk. and its subsidiary PT. Vayatour, Indonesia

Abstract

One of the fundamental issues in e-marketing is how to create values and attract consumer to revisit the Web Site using Web experience. Web experience is a combination of functionality, information, emotion, cues, stimuli, and product/service online which is more than marketing mix element in traditional marketing. Web experience is delivered to consumer through company's Web Site. Using Web experience theoretical framework adapted from Constantinides (2004), this research is aimed to validate the dimensions in the factors of Usability, Interactivity and Trust as the indicators of Web experience. Based on quantitative perspective, by using confirmatory factor analysis method, this research found the new pattern of relationship between Web experience's factors and dimensions. This result shows that what marketer think best for the Web Site can be different from the consumer's perspective. This occurs because consumer has their own perception about Web experience which is shaped by their controlled and uncontrolled experiences, both online and offline. Since this research discovered new indicators for Web experience: the factors of usability, commerce, credibility, and trust, this research can be the basis for the theoretical and strategy development in online marketing communication.

Keywords: technology management, e-marketing, online marketing communication, web experience

1. Introduction

Internet Marketing is the process of building and maintaining customer relationships through online activities to facilitate the exchange ideas, products, and services that satisfy the goals of both parties; the firms and customers (Mohammed et al., 2002). To design customer's Web experience is one of the crucial steps in managing Internet technology for marketing use. Mohammed et al. (2002), propose seven steps of Internet marketing implementation: setting corporate and business-unit strategy, framing the market opportunity, formulating the marketing strategy, designing the customer experience, designing the marketing program, crafting the customer interface, and evaluating the results of the marketing program.

For most companies, developing Web Site is the first step in starting online marketing campaign (Amstrong and Kotler, 2003). Companies invest their capital to develop Web Site as a part of company's promotion efforts (Park and Getzel, 2007). However, research shows that most customers had a bad experience when visiting Web Site (Dieringer Research Group in Constantinides, 2004; Nua Internet Survey, 2002; Nielsen 2002; Hesketh, 2002 etc). The study from Nielsen (2002) found out 90% of Web Site were designed without considering user perspective. On the other hand, research

shows that today's customers are less tolerant of bad service, with 80% of consumers saying they will never go back to an organization after a bad customer experience, up from 68% in 2006 (Harris Interactive, 2007).

Previous studies which purposed to identify and evaluate successful factors of Web Site were comes from multiple disciplines such as tourism, marketing, information system, human-computer interaction, advertising etc. There were several names had given to this study such as Web Site evaluation, e-satisfaction, Web quality, e-quality, e-loyalty, customer experience, and Web experience (Park and Gretzel, 2007). The evaluation of the Web Site's successful factor can give benefits such as repeat customers, positive return on investment, and competitive advantages (Cronin, 2003).

The research strategy was to validate the framework of Web experience adapted from Constantinides (2004) which was a comprehensive study over 28 academic journals from five conference proceeding. Out of the 48 papers studied by Constantinides (2004), 42 (88 per cent) were published between the years 2000 and 2003 and six (12 per cent) between 1997 and 1999. The majority of papers were drawn from the Journal of Electronic Commerce Research, the Journal of Consumer Marketing, the Journal of Information Management and the

Journal of Internet Research (Constantinides, 2004). In order to get complete construction of the model in this study, I also used other literature such as Chaffey and Smith, (2008), Zhang and Tang (2006), Mohammed et. al (2002) etc. Therefore, the original model of Web Experience from Constantinides (2004) consist of five factors: usability, interactivity, trust, design, and marketing/promotions. However, this research only adapted first of three factors mentioned above because of research limitation due to the need of research on specific Web Site and its customers.

The objective of this paper is to validate the dimensions in the factors of Web experience. First it intends to validate the dimensions of convenience, site navigation, ordering/payment process, search facilities/process, site speed, findability/accessibility and information architecture in the factor of Usability. Second it intends to validate the dimensions of customer service/after sales, interaction with company personnel, customization, and network effects in the factor of Interactivity. And finally it intends to validate the dimensions of transaction security, customer data misuse, customer data safety, guarantees/return policies, and uncertainty reducing elements in the factor of online Trust. This study makes a unique contribution to Internet Marketing studies by empirically examining the correlation between dimensions and each factors of Web experience.

2. Theory and Research Hypothesis

Several academics and practitioners have identified the “online shopping experience” or “virtual experience” as a crucial e-commerce marketing issue. Tamimi et al. (2003) define the online shopping experience as a process of four stages describing the successive steps of an online transaction. Considering that an online customer is not simply a shopper but also an information technology user (Cho and Park, 2001) one can argue that the online experience is a more complicated issue than the physical shopping experience: the Web experience can be defined as the consumer’s total impression about the online company (Watchfire Whitepaper Series, 2000) resulting from his/her exposure to a combination of virtual marketing tools “...under the marketer’s direct control, likely to influence the buying behavior of the online consumer” (Constantinides, 2002, p. 60). The Web experience embraces elements like searching, browsing, finding, selecting,

comparing and evaluating information as well as interacting and transacting with the online firm (Constantinides, 2004). The virtual customer’s total impression and actions are influenced by design, events, emotions, atmosphere and other elements experienced during interaction with a given Web site, elements meant to induce customer goodwill and affect the final outcome of the online interaction (Constantinides, 2004). Model for the Web experience in this study consists of three important factors. Based on theoretical framework adapted from Constantinides (2004), I propose 16 dimensions to validate (Figure 1).

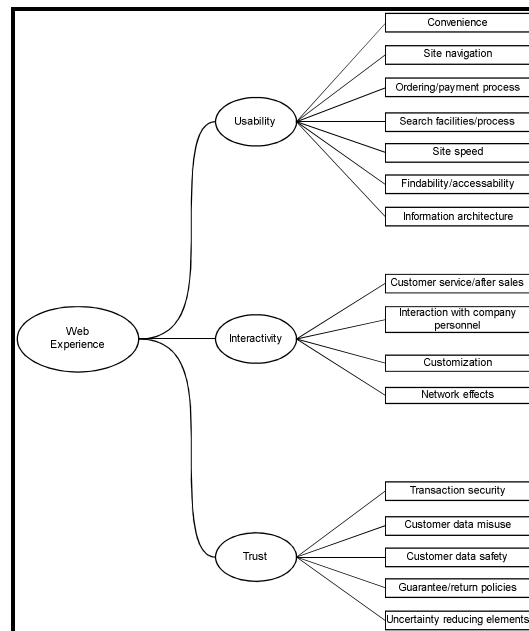


Figure 1. Framework of Web Experience

2.1 Usability

Usability is a concept applied to the design of a range of products which describes how easy they are to use (Chaffey and Smith, 2008). On the web, usability is a necessary condition for survival. If a Web Site is difficult to use, people will leave (Nielsen, 2003). Web usability can be define as “ the ability to find one’s way around the Web, to locate desired information, to know what to do next, and, very importantly, to do so with minimal effort (Nah and Davis, 2002). Central to this idea of usability are the important concepts of ease of navigation and search” (Nah and Davis, 2002). Usability is considered as an important quality criterion of information systems (Preece et al., 1994) and Web sites (Osterbauer et al., 1999). Elements enhancing

the Web site usability are the convenience of using the site, the loading speed of the pages, the information structure, etc (Constantinides,2004). Thus, I propose as my first hypothesis:

H1: Convenience, site navigation, ordering/payment process, search facilities/process, site speed, findability/accessability, information architecture are the dimensions of Usability factor.

2.2 Interactivity

The degree of interactivity is defined as the extent to which a two-way flow of communication occurs between the firm and customer (Mohammed et al., 256). Interactivity requires a dialogue between firm and customer in which both parties listen to, respond to, and serve the needs of the other (Mohammed et al., 2002). The interactivity of Internet allows online vendors to enhance the Web experience by presenting the customer with more personalized services and facilitating interaction with other online users willing to share experiences and suggestions (Constantinides, 2004). Interactivity therefore can be seen as underpinning two of the basic elements of the Internet revolution, namely personalization and networking (Constantinides, 2004). Interactive elements are contributing to a positive customer experience by reducing uncertainty during the online transaction and the cognitive dissonance afterwards (Constantinides 2004). Elements enhancing interactivity are facilities allowing interaction with vendors in case customers have questions or difficulty to use the site, online helpdesks for technical assistance or support (Constantinides, 2004). Networking and the possibility of establishing contacts with other users by means of active or passive interfaces (user's forums, chat-rooms or bulletin boards) are also factors enhancing the Web site interactivity (Constantinides, 2004). Thus, I propose as my second hypothesis:

H2: Customer service/after sales, interaction of company personnel, customization, and network effects are the dimensions of Interactivity Factor.

2.3 Trust

Trustworthiness is a trait that is established over time, after users have the chance to evaluate the site's service. Trust, as in the academic literature, is the core of e-commerce which is related to security and the degree of fulfillment (Lynch and Lundquist, 1996). Kimmerly and McCard (2002) define trust as customer's willingness to accept vulnerability from online transaction based on positive hope which will be decide the next step in shopping online. A study of Grabner-Krauter and Kaluscha (2003) underlines the complexity of this subject. Based on an extensive review of research work done in this field these researchers identified trust constructs reflecting "...both institutional phenomena (system trust) and personal and interpersonal forms of trust (dispositional trust, trusting beliefs, trusting intentions and trust-related behaviors..."(Grabner-Krauter and Kaluscha, 2003). Online marketers should identify elements enhancing or undermining trust among potential customers and try to understand how those can affect the online customer's perceptions (Constantinides, 2004). Egger (2002), mention several important factors to develop and maintain customer's trust. Those factors can be divide in to three categories: pre-purchase knowledge, interface properties, and content information such as guarantee policies (Egger, 2002). Guarantee policies dimension is also mention by Urban et.al (2000). Kim & Moon (1998), Roy et. al (2001) and Chaffey & Smith (2008) have mentioned the empirical fact that the visualization also can manipulate or create trust from customer. Chaffey and Smith (2008) proposed the effect of third party approval and endorsement which can decrease the risk perception. Thus, I propose as my third hypothesis:

H3: Transaction security, customer data misuse, customer data safety, guarantee/return policies, and uncertainty reducing elements are the dimensions of Trust factor.

3. Research Methodology

3.1 Participants

This research recruited 68 respondents. These participants were student of Universitas Negeri Jakarta (Indonesia). The participant represented a very diversified group. Their ages ranged from about 18 to 25 and there was a wide representation of different cultures, races, and also field of studies and degrees. Their

frequencies using Internet also varied. Of the participants: 54.4% used Internet a few times in a week, 38.2% daily, 4.4% weekly, 1.5% a couple of times in month, and 1.5% used Internet rarely. Their perceptions over Internet importance were also different. Among these respondents: 44.1% thought Internet was important, 42.6% said crucial, 10.3% useful, and 2.9% said that Internet is not a very important thing in their lives. For overall impression over previous Web Experience, 45.6% respondents said positive, 25% very positive, 23.5% enough and 5.9% said have negative impression when visiting Web Site.

3.2 Development of Questionnaire

To test Web Experience model, I created a set of questions for survey of Internet users among the student of Universitas Negeri Jakarta. All questions for this questionnaire were adapted from text books and related studies (e.g. Constantinides, Chaffey & Smith, Zhang & Tang, Mohammed et al., etc.) in order to increase their content validity.

3.3 Data Collection and Analysis Technique

With help from one field researcher, I conduct direct interview face-to-face using interception method to get data using questionnaire which I have prepared before. Then, the participant was asked to complete all questionnaires page by page. After respondents had finished the survey, the primary data were categorized, organized, and analyzed using statistic techniques based on types of data required. To accomplish the purpose of the research, I performed confirmatory factor analysis (CFA) in order to investigate the validity of dimensions in the factors of Usability, Interactivity, and Trust as the indicators of Web Experience in online marketing.

3.4 Measurement Validation

To ensure construct validity in measurement, the test of instrument validity using Pearson's Product Moment Correlation technique was performed. Among the 73 items of question before, 13 items were dropped out, and left 65 questions for the survey in order to measure dimensions of Web Experience's factors. On the other hand, to ensure the reliability of the research instrument, the test using Cronbach's coefficient alpha was also performed. The result shows that the alpha

coefficient had exceeded the cutoff point of 0.7 which indicate that the instruments were reliable to use.

4. Result

Confirmatory factor analysis (CFA) over Web Experience model with SPSS 15.0 was used to investigate the correlation between factors and dimensions which represent by matrix factor. To proceed the factor analysis, measure of sampling adequacy (MSA) was calculated first, and then the total variance were explained to get the extracted factors. The result shows that MSA had exceeded the 0.5 standard (including all of 16 variables) and four factors had eigen value bigger than 1 which represent the extracted factors in the model. Then, the confirmatory factor analysis was performed and also rotated using varimax method. After that, I performed examination over the residuals to investigate difference between observed variable before and after factor analysis in the correlation matrix to test the model fitness and found out that only 40% of the residuals surpassed the limit of 0.05. With this result I concluded that the research model was fit. Table 1 shows the result of rotated components matrix.

Table 1. Rotated Components Matrix

	Component			
	1	2	3	4
Convenience (X1)	,585	,459	-,249	,215
Site navigation (X2)	,360	,616	,276	,141
Order/payment process (X3)	,762	,322	-,165	,107
Search facilities/process (X4)	,728	,233	,243	-,024
Site speed (X5)	,558	,268	,379	,268
Findability/accessability (X6)	,655	,147	,317	,091
Information architecture (X7)	,654	,287	-,034	,412
Customer service/after sales (X8)	,482	,595	,307	,154
Interaction with company personnel (X9)	,305	,602	,291	,223
Customization (X10)	,048	,860	,182	,157
Network effects (X11)	,180	,521	,573	-,106
Transaction security (X12)	,304	,773	,030	,213
Customer data misuse (X13)	,111	,221	,795	,100
Customer data safety (X14)	,045	,185	,525	,715
Guarantees and return policies (X15)	,144	,232	-,046	,858
Uncertainty reducing elements (X16)	,664	-,038	,438	,221

Based on Table 1, there were several changes in Web Experience model. First, the dimension of site navigation was not related to usability factor. However, the dimension of uncertainty reducing elements was found to have connection with the concept of usability. Second, the dimensions of site navigation, transaction security were significantly correlated to the interactivity factor which brought me to rename the interactivity factor using the word of “commerce”. Third, I also found that only two dimensions were correlated to the factor of trust. Those dimensions were guarantee/return policies and customer data safety element. And last, the customer data misuse and the network were correlated to the new factor, named as credibility factor. Figure 2 shows the new model of Web Experience. In summary, hypothesis 1, 2, and 3 were not supported in this research findings and the new pattern of correlation between dimensions and factors were developed.

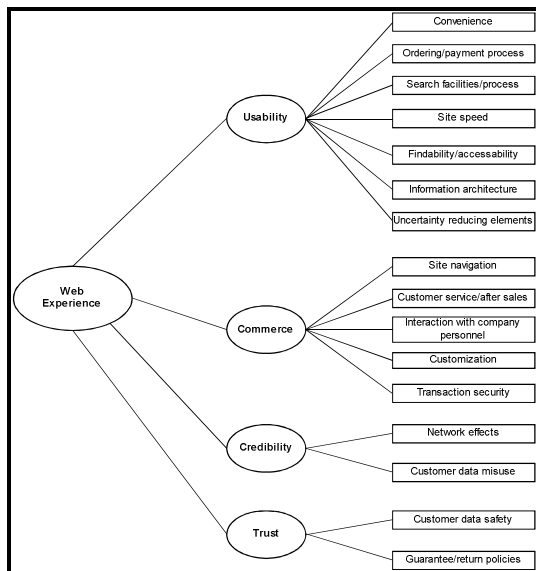


Figure 2. New Model of Web Experience

5. Conclusion

This study attempt to validate the dimensions in the factor of usability, interactivity, and trust as the indicators of Web Experience in Marketing Online. The main contribution of this study was the finding of new Web Experience model for Web-based Marketing. First, the usability factor was constructed by dimensions of convenience, ordering/payment process, search facilities/process, site speed,

findability/accessability, information architecture, and uncertainty reducing elements. Second, dimensions of site navigation, customer service/after sales, interaction with company personnel, customization, and transaction security were hypothesize as the dimensions of commerce factor. Third, network effects and customer data misuse were framed up the factor of credibility. Finally, the factor of trust was conceptualize by the dimensions of customer data safety and guarantee/return policies. This study has several limitations. First, it suffers from methodological limitation, in that it relies on survey which was not represent specific population. Second, this study was not yet identify the pattern of relationship between dimensions and factors based on the step of customer’s buying process and the category of high/low involvement product. Finally, the survey was conducted in Indonesia, and mostly with Indonesian Internet users. In spite of these limitations, the study has several interesting theoretical and practical implications. First, this Web Experience framework can help online marketer or Web designer to identify the elements that need special concern in creating, developing, or evaluating online channel for companies. Second, the study can be the bases for hypothesis development in the direction of developing comprehensive theory of online marketing communication and online consumer buying behavior. Third, this study provides insight for marketing management specifically in implementing marketing strategies using online channel. In conclusion, this study supported the previous study by Constantinides (2004) that Web experience must be regarded as dynamic and evolving subject rather than a static one. Development of Internet technology such as Web 2.0 (social media) will continuously encourage fast innovation in marketspace and provoke consumer’s empowerment that need further research. The framework of Web experience developed in this research is an important step in this direction.

References

- Amstrong, Gary., & Philip Kotler (2003), “Marketing: an introduction (6th edition),” *New Jersey: Prentice Hall*.
- Chaffey, Dave., & PR Smith (2008), “eMarketing eXcellence: Planning and Optimizing Your Digital Marketing,” *USA: Elsevier*.

- Kotler, Philip., & Kevin Keller (2006), "Marketing management (12th edition)," *New Jersey: Prentice Hall*.
- Loudon, David L., & Albert J. Della Bitta (1993), "Consumer behavior (4th ed)," *Singapore: McGraw Hill*.
- Malhotra, Naresh K. (2004), "Marketing research: an applied orientation (4th ed)," *New Jersey: Pearson Prentice Hall*.
- Mohammed, Rafi, A. Et al. (2002), "Internet marketing: building advantage in a networked economy," *New York: McGraw Hills*.
- Smith, Paul Russel (1998), "Marketing Communication (2nd ed)," *London: Kogan Page Limited*.
- Constantinides, Efthymios (2004), "Influenceing online consumer's behavior: the web experience," *Internet Research: Emerald Group Publishing Limited*.
- Cronin, J. J. (2003), "Looking Back to See Forward in Services Marketing: Some Ideas to Consider," *Managing Service Quality*, 13 (5): 332-337.
- Cronin, M. J. (1995), "Doing More Business on the Internet: How the Electronic Highway Is Transforming American Companies," *New York: Van Nostrand Reinhold*.
- Hoffman, Donna L., Thomas P. Novak, & Patrali Chatterjee Project 2000: "Research Program on Marketing in Computer-Mediated Environments," *Owen Graduate School of Management, Vanderbilt University*.
- Nah, F.F.-H. & Davis, S. (2002), "HCI Internet research issues in e-commerce," *Journal of Electronic Commerce Research*, Special Issue: Human Factors in Web-based Interaction, Vol. 3 No. 3.
- Park, Young A., & Ulrike Gretzel (2007), "Success factor for destination marketing Web Sites: a qualitative meta analysis," *Journal of Travel Research: Sage Publications*.
- Urban, G. (2003), "Customer Advocacy: Is it for you?," *MIT Sloan School of Management*.
- Urban, G. (2005), "Don't Just Relate - Advocate!: A Blueprint for Profit in the Era of Customer Power," *Upper Saddle River, NJ*.
- Zhang, Xi., & Yu Tang (2006), "Customer perceived E-service quality in online shopping," *Master Thesis. Lulea University of Technology*.
- Nielsen, J. (2007), "Web 2.0 can be Dangerous," *Jakob Nielsen's Alertbox*, (<http://www.useit.com/alertbox/web-2.html>), accessed 17 December 2007.

Perceived Usefulness and Buying Intention in Kaskus

Fransisca Budyanto Widjaja, Ivan Prasetya

School of Business and Management (SBM), Institute of Technology Bandung (ITB), Indonesia

Abstract

Purpose: The purpose of this research is to understand the impact of perceived usefulness to consumer's buying intention in Indonesia's largest online community, Kaskus.

Research Methodology: This research used survey by distributing questionnaire to internet user. The questionnaire is using likert scale. There's three variables that are considered important in influencing buying intention in Kaskus: web security, perceived ease of navigation, and perceived usefulness.

Findings: The outcome of this research is that consumer think Kaskus is a trustfull site and they feel secure in giving their personal information to this site. But, analysis from this research show that perceived usefulness is more influencing consumer's buying intention in Kaskus than ease of navigation and perceived security.

Keywords: web security, perceived ease of navigation, perceived usefulness, buying intention, Kaskus

1. Introduction

In the last decade, internet has influence shifting in many aspect of human life. Using internet, people across the world can communicate and share information with each other. Gathering real time information is one of benefits that internet provided. Internet also become the media for people across the world to trade. Businesses also use internet in their activity, thus we called e-business. E-business according to Wikipedia is "may be defined as the application of information and communication technologies (ICT) in support of all the activities of business". ([http://en.wikipedia.org/wiki/Electronic business](http://en.wikipedia.org/wiki/Electronic_business)) One part of e-business is e-commerce, which means buying and selling using information technology or internet.

E-commerce has grow rapidly and people can easily find goods to fulfill their need in internet. The goods which being sold is vary and with a competitive price. In Indonesia, using internet to buy goods also become a new trend and many local website or forum become media to trade. Sometimes when trading in those website or forum, people have to submit their personal data and this make web security become an important thing to be considered before deciding to shop in internet.

In 2001 W. David Salisbury, Rodney A. Pearson, Allison W. Pearson, and David W.

Miller conducted a research about perceived security and world wide web purchase intention. The research built a three construct, first the role of web's ease of navigation to purchase intention, second is usefulness of web to purchase intention, and third is web's security to purchase intention. Result showed that web security was the most influencing factor for people to decide whether to shop in world wide web or not. Now, this past ten years, world wide web already done many things to increase the web security and this study is going to adopt their research, with different condition and research objective.

This research is going to identify perception of internet user about the security, usefulness, and ease of navigation towards the buying intention in Indonesia's largest online community, Kaskus. Kaskus was build in 6 November 1999 by three Indonesian student in Seattle, America. Now, Kaskus's member is already more than 1,000,000 people.

2. Literature Review

There's some factor that influence people in deciding whether to shop online or not. Many previous researcher have their own perception about those factors. In 2008, HsinHsin Chang and Su Wen Chen investigate about online information cues, whether web site quality and website brand

influence customer perceived risk and trust which at the end affect customer purchase intention. Product type, prior purchase, and gender are more likely to influence purchase intention (Mark Brown, Nigel Pope, Kevin Voges, 2001). In Eun Young Kim and Youn-Kyung Kim's research about online purchase intention for clothing products, it is said that there's four attributes and predictors of the intention to purchase online, they are transaction/cost, incentive program, site design, and interactivity.

Carla Ruiz Mafe' and Silvia Sanz Blas's research (2006) involve demographical factors in internet dependency and how internet dependency positively influence purchase intention in internet. Their research also mentioned that medium exposure as well as individual online experience influence people's online purchase intention. That the more surfing experience that one has, it will more motivates them to do online shopping. They also said that to increase internet user's willingness to purchase, the website have to provide more and useful information on their product and make their search engine to work faster, easier to access, and provide a right kind information and can be accessible in a right time. Both Carla Ruiz Mafe and Silvia Sanz Blas and Eun Young Kim and Youn-Kyung Kim's research said that layout or web design affect the ease of navigation of a web and that the usefulness of information gathered from the website influence customer's intention to shop online. Useful and easily understood information on websites diminish asymmetric information, information behaviour, increase the degree of online trust, and positively effects purchase intention (Koufaris and Hampton-Sosa, 2004). Van der Heijder said that enjoyment of technology or surfing in internet motivate customers to transact online. Perceived usefulness states to belief that a particular system would improve job performance and generosity toward a website, perceived ease-of-use is the belief that a particular system would be free from effort (van der Heijden et al., 2003). In this research, we hypothesized:

H1: Ease of navigation will favorably influence buying intention in Kaskus

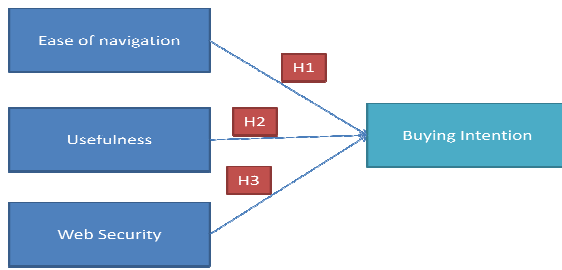
H2: Perceived usefulness will favorably influence buying intention in Kaskus

According Yu-Hui Chen and Stuart Barnes (2007), online purchase intention are determined by perception to the website and online trust. Online trust means web security assurance, web searching, reputation, and interactions (Yoon, 2002). Salisbury research show that increased level of perceived web security will lead to greater intent to purchase product online (W. David Salisbury, Rodney A. Pearson, Allison W. Pearson, and David W. Miller, 2001). When people do online shopping, sometimes they have to submit their personal information, such as credit card number, or their bank account number, in deciding whether to shop online or not, people have to be sure that their personal information will not go to other party. Avinandan Mukherjee and Prithwiraj Nath (2005) said that website have to gain customer trust and commitment by delivering promised they had made. In shopping through the internet, there's no physical interaction between seller and buyer, so, trust is everything. Website have to fulfill what they promised to deliver to their customer, it is the only way to gain trust. They also said that privacy and web security are key antecedent of trust. That's what push the birth of the third hypotheses.

H3: Perceived security will favorably influence buying intention in Kaskus

Factors influencing people's buying intention on website based on the literature review's done previously are: ease of navigation, perceived usefulness, and perceived security, as can be seen in the Figure 1.

Figure 1. Theoretical Framework



3. Research Design

This research is a survey research. Eighteen number questions in a single questionnaire are distributed through the internet to internet user who ever visited Kaskus. The questionnaire is assessing respondent point of view of Kaskus's performance in navigation, usefulness, and security by using five point likert scale (very agree – very disagree).

The validity is tested by using factor analysis and if the KMO's score is greater than 0.5 means that the questionnaire are valid. Cronbach's Alpha is used to measure the questionnaire's reliability. The questionnaire item will be said as reliable if the Cronbach's Alphas core is greater than 0.6.

The hypotheses are tested by using multiple regression. All the statistical calculation are calculated using SPSS 17.

4. Result/Implication

4.1 Descriptive Statistics

Through the distribution of questionnaire through internet, there's 66 questionnaires that are filled completely, with 57.6% respondent are male and 42.4% respondent are female.

From the descriptive statistics, 42.2% of respondent spent more than 20 hours a week using internet and most of them use internet for social networking purpose.

Figure 2. Time Using Internet per Week

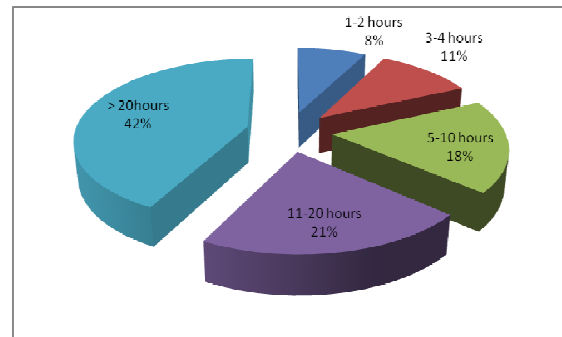
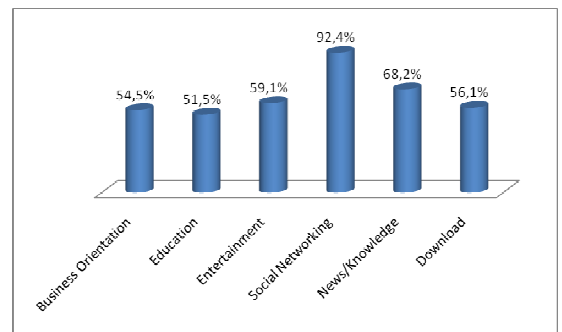
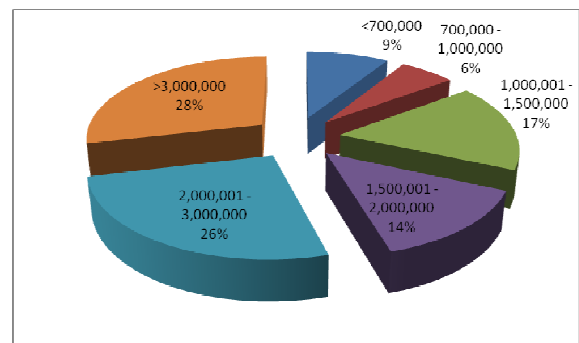


Figure 3. Purpose in Using Internet



The following table represent respondent's income per month. More than 50% of them, who browse Kaskus, have income above than 2,000,000 rupiah per month.

Figure 4. Income



4.2 Validity and Reliability

To test the validity of the questionnaire, SPSS 17 was used and the result were valid

because all of the questionnaire item have KMO's score greater than 0.5.

Table 1. Scale Item

<p>Ease of Navigation (KMO = 0.868)</p> <ul style="list-style-type: none"> • I'm easy to find product that I need on Kaskus Trading Forum. • Kaskus Trading Forum is easy to access. • Navigating pages on Kaskus Trading Forum is easy for me. • I'm easy to search information on Kaskus Trading Forum.
<p>Perceived Security (KMO = 0.822)</p> <ul style="list-style-type: none"> • I would feel secure sending information across Kaskus Trading Forum. • Kaskus is a trust website. • I would totally believe to everything that inform by seller on Kaskus Trading Forum. • I do not have a lot of consideration when I have to send my personal information on Kaskus Trading Forum.
<p>Perceived Usefulness (KMO = 0.822)</p> <ul style="list-style-type: none"> • I feel that Kaskus Trading Forum make me easier in buying product. • Kaskus Trading Forum make me easier to find product that I need. • Sometimes, product that I'm hard to find in conventional store could I find on Kaskus Trading Forum. • Kaskus Trading Forum provides many varieties product that I need.
<p>Buying Intention (KMO = 0.753)</p> <ul style="list-style-type: none"> • I would use Kaskus Trading Forum for purchasing a product. • Using Kaskus Trading Forum for purchasing a product is something I would do. • I will buy a product on Kaskus trading Forum when I find product that fits my needs. • Kaskus Trading Forum is the first site I will choose to do online shopping.

The reliability of the questionnaire is tested by using Cronbach's Alpha. All questionnaire are reliable because all the Cronbach's Alpha score is greater than 0.8.

4.3 Multiple Regression and Result Analysis

As it said before, there are three hypotheses to be tested. Multiple regression is tested whether the independent variable are significant towards the dependent variable. If the significant level is smaller than 0.05, then

the independent variable are significant towards the dependent variable.

Using SPSS, the result of multiple regression is mentioned in table below:

Table 2. Regression Model

Variable	Coefficients (B)	Significant Level
(Constant)	-.263	.533
Ease of Navigation	.046	.707
Perceived Security	.154	.157
Perceived Usefulness	.857	.000

The only dependent variable that is significant to the independent variable is perceived usefulness. The value of R square is 0.613 means that 61.3% of purchase intention in Kaskus can be described by perceived usefulness.

So, hypotheses one and three are not significant and only hypotheses two are significant. So, the equation becomes a linear regression equation because there's only one independent variable.

$$y = 0.857x$$

The value of ease of navigation is larger than 0.05 means that this variable is not significantly effect people's purchase intention in Kaskus. At first, it was believed that ease of use is one of the most salient factor in affecting people's online purchase intention. But, Salisbury et.al.'s research also mentioned that ease of navigation appear to be dismissed in affecting online purchase intention. So, the result of this research is supporting the previous research which saying that ease of navigation is not significant to be said in influencing online purchase intention.

Another result of Salisbury's research is that usefulness of web is not significant in effecting people's purchase intention in world wide web. But in this research the result is different. The significant value is 0.00 which is smaller than 0.05 so perceived usefulness

of Kaskus is significant to influence consumer's buying intention.

In Salisbury et. al's research, the only significant factor that affecting purchase intention in world wide web is perceived security. This research is adopting Salisbury et. al's research and come out with different outcome. In this research, perceived value is not significant to influence buying intention. The significant level of this variable is larger than 0.05. This might because of the time frame. Salisbury et. al.'s research was conducted ten years ago and through this last decade, the world wide web or websites already done many things to improve the web security, and this also been done by online store, they do things to make sure that customer's private information is secure. But in this research, one of the reasons of the differences is because in Kaskus, people paid through bank transaction, and sometimes private information are submitted through sms.

5. Conclusion

Many previous researcher did almost the same research and they mentioned many factors related to online purchase intention in Kaskus. Carla Ruiz Mafe' and Silvia Sanz Blas's research (2006) evaluate demographical factors which might influence customer's online purchase intention. Other researcher mentioned about security and web trust and others mentioned about the web display which related to web ease of navigation and also web's utility.

In 2001, W. David Salisbury, Rodney A. Pearson, Allison W. Pearson, and David W. Miller done research in identifying factors that influencing customer to purchase online. Factors that they used are ease of navigation, perceived usefulness, and perceived security. Now ten years later, this research is adopted what Salisbury's et. al. done with research object Kaskus, the largest online community in Indonesia. Using multiple regression, we analyze the result of questionnaire distribution to internet user.

This research's result is differ with W. David Salisbury, Rodney A. Pearson, Allison W. Pearson, and David W. Miller's research. In the previous research the result is web security is the dependent variable that significant to purchase intention in world wide web. The reason of the result differences is because in the last nine years there's many action done to increase web security. The nature of transaction in Kaskus also differ compare to world wide web. In Kaskus, payment transaction is done via bank transaction, that's why in this research, respondent are not worried about security on Kaskus.

This research is not without limitation. The limitation is that this research only focus on Kaskus, with consideration Kaskus is Indonesia's largest online community. But actually, people do shop online not only on Kaskus, but also on other website or even from social network such as Facebook. Future research might evaluate the perception of factors influencing people intention to shop online in various website.

References

- Brown, Mark. Pope, Nigel, Voges, Kevin., 2001, "Buying or browsing? An exploration of shopping orientations and online purchase intention", *European Journal of Marketing*, Vol. 37.No. 11/12, pp. 1666-1684.
- Chang, HsinHsin. Chen Su Wen (2008), "The impact of online store environment cues on purchaseintention: Trust and perceived risk as a mediator", *Online Information Review*, Vol. 32 , No. 6, pp. 818-841.
- Kim, Eun Young. Kim, Youn-Kyung.(2003), "Predicting online purchase intentions for clothingproducts", *European Journal of Marketing*, Vol. 38 No. 7, pp. 883-910.
- Koufaris, M. and Hampton-Sosa, W. (2004), "The development of initial trust in an online company by new customers", *Information & Management*, Vol. 41 No. 3, pp. 377-97.

Mafe, Carla Ruiz. Blas, Silvia Sanz Blas. 2006." Explaining Internet dependency: An exploratory study of future purchase intention of Spanish Internet users", *Internet Research*, Vol. 16, No. 4, pp. 380-397.

Mukherjee, Avinandan. Nath, Prithwiraj. (2007), "Role of electronic trust in online retailing: A re-examination of the commitment-trust theory", *European Journal of Marketing*, Vol. 41, No. 9/10, 2007, pp. 1173-1202.

Salisbury, W. David, Pearson, A. Rodney, Pearson, Allison W., Miller, David W. 2001.

"Perceived Security and World Wide Web Purchase", *Industrial Management & Data Systems*, 101/4, 167 – 176.

Van der Heijden, H., Verhagen, T. and Creemers, M. (2003), "Understanding online purchase intentions: contributions from technology and trust perspectives", *European Journal of Information Systems*, Vol. 12, pp. 41-8.

Yoon, S.J. (2002), "The antecedents and consequences of trust in online-purchase decisions", *Journal of Interactive Marketing*, Vol. 16 No. 2, pp. 4.