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Influences of Antecedent and Outcome Factors on The Speed of New Product Development: A Study of SME Companies in Indonesia

*Pepey Riawati Kurnia**

The research's objective is doing an empirical test toward research conducted by Menon & Lukas (2004), which generates 6 propositions of antecedent and outcome factors in the velocity of new product development. The literature theory based on theory of new product development speed (PDS) with antecedent and outcome factors. The research towards 63 respondent managers of Small and Medium Enterprises (SME) companies in Jabodetabek, Indonesia. Six propositions are developed into 6 hypotheses, which are then subject to a statistical test using LVS. Goodness-of-fit test informs that 6 hypotheses are eligible and so does the Measurement-fit test. Test towards 6 hypotheses using significance level of 0.05 with t value of > 1.96 confirms that the data support 5 hypotheses, except for hypothesis number 6 which states that Product Development Speed has no influence on the Organizational Stress. The results provide managerial, theoretical insight and implication that are useful for New Product Development Speed.

Keywords: product development speed, new product development, infrastructural influences, organizational learning

Tujuan penelitian melakukan tes empiris pada penelitian dari Menon & Lukas (2004) yang menghasilkan 6 proposisi dari faktor-faktor *antecedent* dan *outcome* dalam kecepatan pengembangan produk baru. Kajian teori berlandaskan teori dari Kecepatan Pengembangan Produk Baru dengan faktor penyebab dan hasil. Penelitian terhadap 63 responden manajer dari perusahaan SME di area Jabodetabek, Indonesia. Ke enam proposisi dikembangkan menjadi 6 hipotesis yang kemudian mengalami proses pengujian statistic dengan menggunakan LVS. Hasil Goodness of Fit menginformasikan memenuhi persyaratan demikian pula Uji Kecocokan Pengukuran. Hasil pengujian terhadap 6 hipotesis dengan syarat tingkat signifikansi sebesar 0.05 dengan nilai-t sebesar > 1.96 mengkonfirmasi bahwa data mendukung 5 hipotesis, kecuali hasil pengujian hipotesis 6 yang menyatakan Kecepatan Pengembangan Produk tidak berpengaruh terhadap Organizational Stress. Hasil memberikan wawasan dan implikasi manajerial dan teoritis yang bermanfaat bagi Kecepatan Pengembangan Produk Baru.

Kata Kunci: kecepatan pengembangan produk, pengembangan produk baru, pengaruh infrastruk-tural, pembelajaran organisasi

Introduction

In literatures of new product development, Accelerated Product Development (APD) is known. APD is a phenomenon, an event, a fact or a reality experienced by marketing practitioners in developing products. Menon & Lukas (2004) invented the term Product Development Speed (PDS) which is a central component in the competition strategy (Datar, et al., 1997);

Radas & Shugan, 1998; Shanker, et al., 1998; Zhang & Markman, 1998). According to the Language Centre of National Education Ministry (*Pusat Bahasa Departemen Pendidikan Nasional*, 2005), the word 'acceleration' is a noun meaning the act of accelerating, while 'speed' is a also a noun meaning the time used to go through a certain length. Referring to these de-

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initions, it can be concluded that PDS is the time in which the product development process is accelerated so that the product can enter the market as soon as possible, and the process/act of acceleration is APD meaning “the process of speeding up the new product development process” which can be done by eliminating unnecessary stages, implementing parallel processes, minimizing delays in the decision making process (Bennet, 1995, p1). Furthermore, the discussion uses PDS because both PDS and APD have the same final objective, namely to accelerate the product developing process so that the product becomes the first that enters the market.

Gupta & Wilemon (1990) discovered that product development acceleration is required due to the increasing competition, rapid technological changes, market demands, need to meet the predetermined objectives, need to shorten the product’s life-cycle, senior management’s pressures, and the emergence of a new market. In the global competition, companies are faced with the increasing number of competitors in the same market and the rapid technological advancement encourages them to move faster, hence creating the need for product development acceleration (McDonough III & Barczak, 1991; McDonough III, 1993).

A literature study on PDS carried out by Kessler & Chakrabarti (1996), however, concludes that the ability to understand, explain, and predict PDS is limited due to the lack of theoretical and model developments and lack of empirical and systematic tests of the propositioned relations. Gradually, some marketing studies have started to analyse the antecedents and outcomes of PDS. A number of important studies emphasize cross-functional team and formal product development process in PDS (Griffin, 1997), effects of speed on organizational performance (Ittner & Larcker, 1997), and effects of lead-time on market share at a certain stage of NPD process (Datar et al., 1997). Nevertheless, Menon & Lukas (2004) states that there are no comprehensive conceptual frameworks to organize and direct an integrated and systematic study of PDS in the marketing field. Therefore, a proposition is developed to focus on the antecedents and outcomes of PDS which are closely related to the marketing discipline. For the antecedents, effects of infrastructural

(bureaucratic structure dan adhocratic structure) and procedural (organizational control & interfunctional coordination) factors of PDS are chosen; while for the outcomes, impacts of PDS on internal performance factors of the organization (organizational learning dan organizational stress) are indicated.

With reference to the proposition submitted by Menon & Lukas (2004), the researcher is interested in conducting an empirical test regarding the proposition of PDS implemented in Indonesia. Results of the study conducted by Kurnia (2007) in the food industry in Indonesia conclude that marketers of local and multinational companies have implemented APD, i.e. by not carrying out the complete product development process, for example, by omitting market tests because companies want to immediately launch the products to the target market for speedy market share acquisition. In addition to the food industry, the APD has also been implemented in various industries (Kurnia, 2008). The research questions arises as follow:

1. Do Bureaucratic Structure, Adhocratic Culture, Organizational Control and Interfunctional Coordination influence (negatively/positively) Product Development Speed in medium-large scales companies in several industries in Indonesia?
2. Does Product Development Speed influence (negatively/positively) Organizational Learning and Organizational Stress in medium-large scale companies in several industries in Indonesia?

This research is expected to provide a theoretical contribution to the marketing science as well as managerial and policy contributions to marketing practitioners, mainly those involved in the product development process in medium-large scale companies in several industries in Indonesia. For marketing science in particular, the research is expected to provide a contribution in completing the empirical test in order to build a framework and model of Product Development Speed. In addition, the researcher also hopes that this research benefits managerial practices mainly those carried out by marketing practitioners. Through this research, the influence of structure, culture, control, and coordination on PDS can be found out, so that marketing practitioners can evaluate those factors much earlier

and, therefore, prevent the PDS from failure. Furthermore, marketing practitioners will also understand how PDS influences existing organizational stress and learning, hence minimizing potential loss. There has been no research work in this area.

Results of an explorative study in food industry in Indonesia (Kurnia, 2007a) indicate that APD is indeed required and implemented by local and multinational companies in the food industry in Indonesia. APD will be continuously implemented as part of the company's struggle to win the competition. Research findings confirm that two factors (intuition and capabilities) of the six factors (market opportunity, competition, cost, brand image, intuition and capabilities) have encouraged APD in 32 food companies in Indonesia. Moreover, further study shows that intuition as the APD-driving factor has also a direct influence on the product performance (Kurnia, 2008).

As described in the research background above, as regards product development in particular, this research is aimed at:

1. Conducting an empirical test of a proposition that Bureaucratic Structure, Adhocratic Culture, Organizational Control, and Interfunctional Coordination influence (negatively/positively) Product Development Speed in medium-large scale companies in several industries in Indonesia.
2. Conducting an empirical test of a proposition that Product Development Speed influences (negatively/positively) Organizational Learning and Organizational Stress in medium-large scale companies in several industries in Indonesia.

Literature Review

Product Development Process

Bennet, P.D. (2005, p1) defines New Product Development as "*The overall process of strategy, organization, concept generation, concept and marketing plan evaluation, and commercialization of a new product*". Product development process is a multi-stage and multi-disciplinary process (Cooper, 1996). This activity is called the serial stage of New Product Development cycle (Milson, Raj & Wilemon, 1992).

Definition of Product Development Speed

Product Development Speed (PDS) and Accelerated Product Development (APD) are nouns implying the word 'fast' which here means that new products enter the markets faster by accelerating the product development process in various ways (omitting one of the stages, carrying out a parallel process or minimizing delay in decision making). There is much pressure for firms to accelerate time to market for new products, and this overlapping of phases is an important tool in speeding new products to market (Crawford, & Benedetto, 2008). In a general term, APD is also defined by Kessler & Chakrabarti (1999, p1144) as "*accelerating activities from first spark to final product, including tasks that occur throughout the development process*". Meanwhile, APD is conceptualized in three different ways, first of all by comparing elapse time to the planned and budgeted project time (Cooper & Kleinschmidt, 1994), secondly by comparing elapse time of a project to the elapse time of another project (Nijssen, Arbouw & Commandeur, 1995), and thirdly simply by measuring the elapse time between product conception and product introduction to the commercial market (Ali, Krapfel, & Labahn, 1995). These approaches are widely accepted in various marketing literatures (Griffin, 1997; Ittner & Larcker, 1997). Therefore, Menon & Lukas (2004, p211) define PDS as "*the pace product development activities that occur between idea conception and new product implementation*".

Antecedent and outcome factors of PDS

Since 2002, Menon & Lukas (2004) have tried to provide an integrated framework for the concept of Product Development Speed (PDS). Menon, Chowdury, & Lukas (2002) have used literatures from various disciplines such as finance, human resource, organizational behaviour, and developed conceptual framework and proposition for advanced research on PDS. This is very useful to enrich the marketing perspective in managing the time of new product development.

Menon & Lukas (2004) built a conceptual framework based on several marketing studies

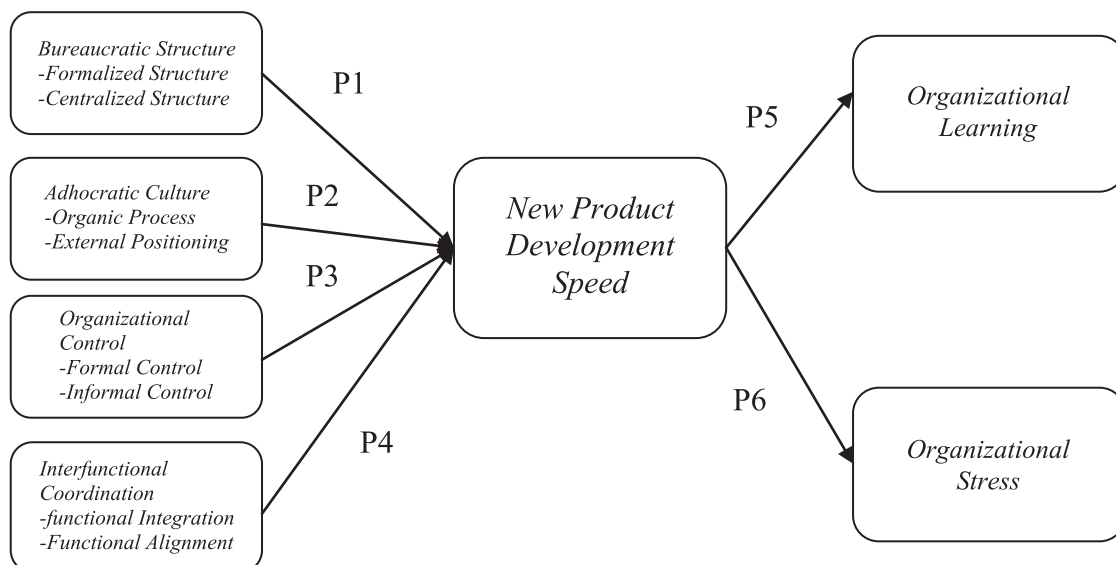


Figure 1. Research Conceptual Model with 6 propositions

Table 1. Research Propositions

Proposition 1	<i>Bureaucratic structure is related negatively to NPD speed. The strength of the relationship varies with the degree of formalized structure and centralized structure.</i>
Proposition 2	<i>Adhocratic culture is related positively to NPD speed. The strength of the relationship varies with the degree of organic process and external positioning.</i>
Proposition 3	<i>Organizational control is related positively to NPD speed. The strength of the relationship varies with the degree of formal control and informal control.</i>
Proposition 4	<i>Interfunctional coordination is related positively to NPD speed. The strength of the relationship with the degree of functional integration and functional alignment.</i>
Proposition 5	<i>NPD Speed is related positively to organizational learning</i>
Proposition 6	<i>NPD Speed is related positively to organizational stress</i>

cited in Datar et al. (1997); Griffin (1997), Ittner & Larcker (1997); and Menon et al. (2002). In the study of PDS influencing factors, Griffin (1997) emphasizes 2 important procedural variables, i.e. *coordination* and *control*. Procedures are not independent but often depend on infrastructure (Menon et al, 2002). Marketing literatures explain that the effects of infrastructure focus on 2 variables, namely *structure* (Kohli & Jaworski, 1990) and *culture* (Deshpande & Webster, 1989). These infrastructural and procedural variables are drivers of APD in the proposed conceptual model.

There are various studies of organizational outcomes of APD. Datar et al. (1997) and Ittner & Larcker (1997) state that speed influences the performance of organizational internal variable. One internal variable that attracts considerable attention in marketing literature is *learning* (Bell, et al. 2002; Slater & Narver, 1995), and another variable is *stress* (Flaherty et al, 1999; Singh, 1998). Increasing the product development speed is not always without cost. Increasing speed will require organizational capabilities which in turn will lead to a stressful

working atmosphere. Eventually this will be a burden to the organizational social structure.

Research Conceptual Model

In building a research conceptual model, the researcher uses literature study as the basis of argumentation. The main literature in use is Menon, & Lukas (2004) that offer 6 propositions to add and build a research conceptual model in Product Development Speed (PDS). The six propositions can be seen in figure 1 and table 1.

In the empirical test research using hypothetical test, researcher simplifies the research conceptual model as shown in figure 2.

The conceptual basis of Hypotheses is built mainly on the following description of Menon & Lukas (2004).

Infrastructural Antecedents of NPD Speed

• Structure

It is widely known among business practitioners and academicians that the organizational

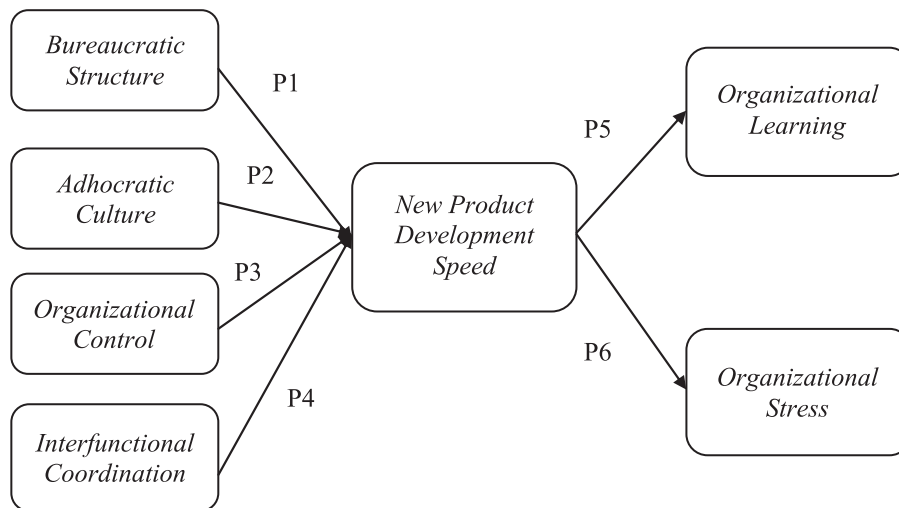


Figure 2. Research Conceptual Model with 6 Hypotheses

structure influences the cycle of New Product Development (NPD) (Kessler & Chakrabarti, 1996; Wheelwright & Clark, 1992). Many organizations that are aware of the importance of speed choose to review the existing hierarchy. Meyer (1994) states that flat structure is the optimum structure, but Galbraith & Nathanson (1978) states that there is no “the best” organizational structure. Eventually, to achieve the optimum structure depends on the task required and the environment of the organization. Structure in an organization can be defined as “the allocation of power across organization level”, the central aspect of a structure is the bureaucratization (Gupta, et al. 1986, p.10) referring to the formal and central structural levels in the organization (Menon & Varadarajan, 1992). Bureaucratic structure is very likely to have a negative impact on the Product Development Speed (PDS). This assumption is based on research findings concerning intra-organizational communication and transaction efficiencies (Kohli & Jaworski, 1990; Menon & Varadarajan, 1992; Zaltman et al., 1973), which state that formalization and centralization inhibit the rapid distribution and effective use of information. Various studies (Kharbanda, 1991; Meyer, 1993; Wheelwright & Clark, 1992) state that the speed of distribution and effective use of information is a critical determinant of PDS. Therefore, it is assumed that bureaucratic structure has a negative impact on PDS, with the following hypothesis:

H1: Bureaucratic structure has a negative impact on the Speed of New Product Development

• Culture

Culture influences the product development time (Chatman & Jehn, 1994; Deal & Kennedy, 1982; Hammer & Champy, 1993; Schein, 1985). Culture in an organization is defined as “the pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide norms for behavior in organization,” (Desphande & Webster, 1989, p4). In marketing perspective, adhocracy is the central aspect of an organization, characterized by organic and external positioning processes. Organic process is characterized by a flexible and spontaneous organizational culture. External positioning process is characterized by an organizational culture that is focused on external elements (Desphande, 1993). Adhocraticulture has a positive impact on PDS, which is relevant with the research findings stating that in an organic culture, externally-oriented culture, flexibility and tolerance are important values to consider. It is very likely that these values encourage adaptation, risk taking, and entrepreneurial behavior which are critical factors for PDS (Smith & Reinertsen, 1991; Stalk & Hout, 1990). Menon & Varadarajan (1990) noted that a manager working in an innovative climate would be more enthusiastic to adopt ideas and concepts coming from outside of their organizations. Hence, it is assumed that adhocraticulture has a positive impact on the product development speed, with the following hypothesis:

H2: Adhocratic culture has a positive impact on New Product Development Speed

Procedural Antecedents of NPD Speeds

• Control

Control mechanism plays a dominant role in forming behavior in new product development (Jaworski et al., 1993). Control can be defined as “*a process aimed at influencing behavior and systems to achieve desired outcomes.*” Organizational control is an organizational aspect that influences the behaviour of organizational members, which in general is divided into formal control and informal control. Formal control refers to the management-initiated mechanism that influences the behavior of organizational members. Meanwhile, informal-control refers to worker-initiated mechanism of influence (Jaworski et al., 1993, p58). Organizational control has a positive impact on new product development. This statement is based on the fact that organizational control provides workers with timing certainty in the cycle of new product development (NPD). Jaworski (1988) stated that training program and implementation of performance standard are aspects to control the practices. Another aspect is the rule that if the informal performance norms are violated, the violator may be dismissed from their group. Therefore, the formal and informal mechanisms of organizational control can help in keeping the workers on the same track as that of the organization. Without these mechanisms, efficiency in NPD will decrease (Kessler & Chakrabarti, 1996). Therefore, it is assumed that Organizational Control has a positive impact on PDS, which can hypothesized as follows:

H3: Organizational control has a positive impact on New Product Development Speed

• Coordination

Coordination of activities in an organization influences the time completion of new product development projects (Olson, et al. 1995). Coordination of activities in an organization can be characterized by synchronization of resource utilization in organizational activities. Interfunctional coordination is the key aspect in an organization (Lukas & Ferrell, 2000), which can

be differentiated into functional integration and functional alignment. Functional integration refers to interdependency among activities in the organization and functional alignment refers to juxtaposition of functional objectives that covers the whole organization (Narver & Slater, 1990; Ruekert & Walter, 1987). Interfunctional coordination has something to do with faster product development. This statement is based on Sethi's research (2000) stating that Interfunctional control helps functional areas to realize the benefits of participating in cross-functional activities and cooperation with other areas in an organization. This interfunctional control makes them feel responsible or have a sense of belonging as group members. This is strengthened by a number of researchers (among others are Jacobson & Ackerman, 1992; Larson, 1989; Growen & Jennings, 1990; Locke et al., 1988) stating that when workers develop the senses of participation and ownership, work environment diversity and workflow problems may be reduced. This also includes reduction in faulted tasks and poor upstream and downstream processes at the stage of new product development (Kessler & Chakrabarti, 1996). Thus, Interfunctional Coordination is assumed to have a positive impact on PDS, which is hypothesized as follow:

H4: Interfunctional coordination has a positive impact on New Product Development

Internal Performance Outcomes of NPD Speed

• Learning

Effort to gain knowledge is the central aspect in learning process. Organizational learning refers to the knowledge gained by an organization from its activities (Bell, et al. 2002). Faster product development provides an opportunity for an organization to learn more than its competitors. In particular, PDS provides more “learning loops” in a certain time frame. PDS also increases the possibility of an organization to fully complete business cycles in connection with previous products (Meyer, 1993), such as me-too products that are developed because of competitions that are decided to remain in the

market to guarantee new product generation. Fast product development projects will encourage all involved levels in an organization to provide inputs more often (Meyer, 1993). Hence, it is assumed that New Product Development Speed has a positive impact on organizational learning, which is hypothesized as follow:

H5: Product development speed has a positive impact on Organizational Learning

• **Stress**

Distress and disfunctional personal development has something to do with stress. Organizational stress refers to disfunctionality and distress of individuals in an organization at the same time due to conditions or events already set in the organization (Flaherty, et al. 1999; Singh, 1998). In the accelerated new product development process, workers are demanded to complete the same tasks but in shorter times. This can be a pressure for the unit in the organization trying to meet the expectation in product development speed, Cooper (2011) says that one of the dark side to accelerated new product development process is setting unrealistic timelines to achieve launch deadlines creates frustration, tension, and morale problems among project team members when milestones are invariably missed. Certainly, however, members of the organization can also enjoy a new-paced environment than can channel their aspirations physically and emotionally. Hence, it is assumed that Product Development Speed has a positive impact on Organizational Stress, which is hypothesized as follow:

H6: Product development speed has a positive impact on organizational stress

Connection among those hypothesis (Figure 2) can be concluded in Table 2.

Methods

Data Collection Method

This research was carried out through a field study using a questionnaire sent to the respondents. The questionnaire was adapted by the researcher from the research questionnaire made by Kurnia (2008). This question-

naire was distributed in the a gathering held by PDMA (Product Development Management Association) Indonesia in cooperation with Indonesian Food and Beverage Association (GAPMMI, *Gabungan Pengusaha Makanan dan Minuman Indonesia*) that was successfully attended by about 80 marketing practitioners mostly involved in product development. As a gift, each respondent was given a book made in cooperation with PT. PBP. 61 questionnaires were returned back and usable for analysis that indicated respon rate is 76.26%.

Population, Sampling and Respondents

Population in this research is divisions in companies involved in product development in middle-up scale food companies. The sample is gained from population of companies' divisions per product/brand category of middle-up scale food companies located in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi). The unit of analysis is a middle-up scale food company that has product development. Positions of the respondents involved in product development vary, highly depending on the organizational structure, in general from manager assistant to manager levels. The researcher developed questionnaires based on literature review which was written on as variable operationalisation in Table 3 to distribute in gathering of PDMA Indonesia.

Results & Discussion

Result

Research Structural Model can be seen in Figure 3

• **Measurement Model Analysis**

To measure the validity and reliability of each construct in the conceptual model, the researcher carried out Measurement Model Analysis, i.e. analyzing connection between latent variables and observed variables. According to Wijanto (2005), quoting Bollen (1989), alternative definition of observed variable's validity is *factor loadings* of the variable in connection with other variables. Requirements

Table 2. Conclusions on Research Hypotheses

H1	Bureaucratic Structure influences negatively Product Development Speed
H2	Adhocratic Culture influences positively Product Development Speed
H3	Organizational Control influences positively Product Development Speed
H4	Interfunctional Coordination influences positively Product Development Speed
H5	Product Development Speed influences positively Organizational Learning
H6	Product Development Speed influences positively Organizational Stress

Table 3. Variable Operationalization

VARIABLE	DEFINITION	SCALE
Structure	“The allocation of power across organizational level” (Gupta, et al. 1986, p. 10).	Likert 1-5
Bureaucratic	Bureaucratization: the level of structural formalization and centralization within an organization (Menon & Varadarajan, 1992, p63).	
Formalization	The <u>rigidity and specificity of the rules that define roles and relationships among individuals</u> within an organization (Kohli & Jaworski, 1990).	
Centralization	The extent to which <u>decision-making and professional responsibilities</u> originate from a position of central authority as opposed to <u>being delegated</u> throughout the organization (Kohli & Jaworski, 1990, p10).	
Culture	“The pattern of <u>shared values and beliefs</u> that help individuals understand organizational functioning and thus provide norms for behavior in organization” (Desphande & Webster, 1989, p4)	
Adhocracy	Central aspect in organization characterized by <i>organic</i> process and <i>external positioning</i> (Desphande, et al. 1993)	
Organic Process	Characterized by <u>flexible and spontaneous</u> organizational culture. Menon & Varadarajan (1992, p64) stated, “managers operating in such an innovative climate would be more willing to adopt ideas and concepts that may have originated outside their organization,”	
External Positioning	Characterized by organization having a culture focused on external elements (Desphande, 1993). In organic organizational culture, externally oriented culture, flexibility and tolerance are important values to consider.	
Control	Plays dominant role in forming behaviours in new product development (Jaworski et al., 1993). Definition of control: “a process aimed at <u>influencing behavior and systems to achieve desired outcomes</u> ”. Control mechanism can provide <u>discipline and efficiency</u> in the new product development process that is connected to shorter development cycle (Kessler & Chakrabarti, 1996; Kharbanda, 1991; Meyer, 1993; Wheelwright & Clark, 1992). Organizational control: organizational aspect influencing behaviours of the organization’s members, consisting of <i>formal control</i> dan <i>informal control</i> .	
Formal Control	“Management-initiated mechanisms that influence the behavior of organizational members” (Jaworski, et al., 1993, p59).	Likert 1-5
Informal Control	Typically concerns worker-initiated mechanisms of influence (Jaworski et al, 1993, p 59).	
Coordination	Coordination of activities in organization influences time completion of new product development projects (Olson, et al. 1995). Coordination in organization can be characterized by <u>synchronization</u> of resource utilizations in organization’s activities.	
Interfunctional Coordination	Key aspect in organization, can be differentiated into <i>functional integration</i> and <i>functional alignment</i> (Lukas & Ferrell, 2000). Interfunctional Coordination has something to do with faster product development.	
Functional Integration	Refers to <u>interdependency among activities</u> in organization (Narver & Slater, 1990).	
Functional Alignment	Refers to <u>juxtaposition of functional objectives</u> that covers the whole organization (Narver & Slater, 1990; Ruekert & Walker, 1987).	
Organizational Learning	Learning process. Effort to gain knowledge is the central aspect in <i>learning</i> process, referring to opinion of Bell et al., 2002, <i>independent entities, can acquire knowledge as a result of organizational activity</i> . Accelerated product development provides an opportunity to a company to learn more than its slower competitors. Accelerated product development also increases possibility for the company to complete the business cycle in connection with the product it releases. Company should improve its learning ability, for example by improving and developing interdepartmental information sharing, so that more of the organization’s parts will enjoy the benefits.	
Organizational Stress	Stress: disfunctional personal development. <i>Organizational stress</i> refers to <u>disfunctionality and distress</u> of individuals in an organization at the same time due to set-out conditions or occurrences in the organization (Flaherty, et al. 1999; Singh, 1998). In the accelerated new product development process, workers are demanded to complete the same tasks but in shorter times. Accelerated new product development process can be a pressure for the unit in the organization trying to meet the expectation in product development speed.	

for Measurement-fit Test include standardized factor loadingscore of $\geq 0,50$ or ideally ≥ 0.70 , t value of ≥ 2 , construct reliability score if $\geq 0,70$, variance extractedscore of ≥ 0.50 (Hair

2006; Wijanto, 2005, 2008). Table 4 and Table 5 inform the results of Measurement Model’s indicator test for Reliability and Validity of Construct (see attachment 2 and 3).

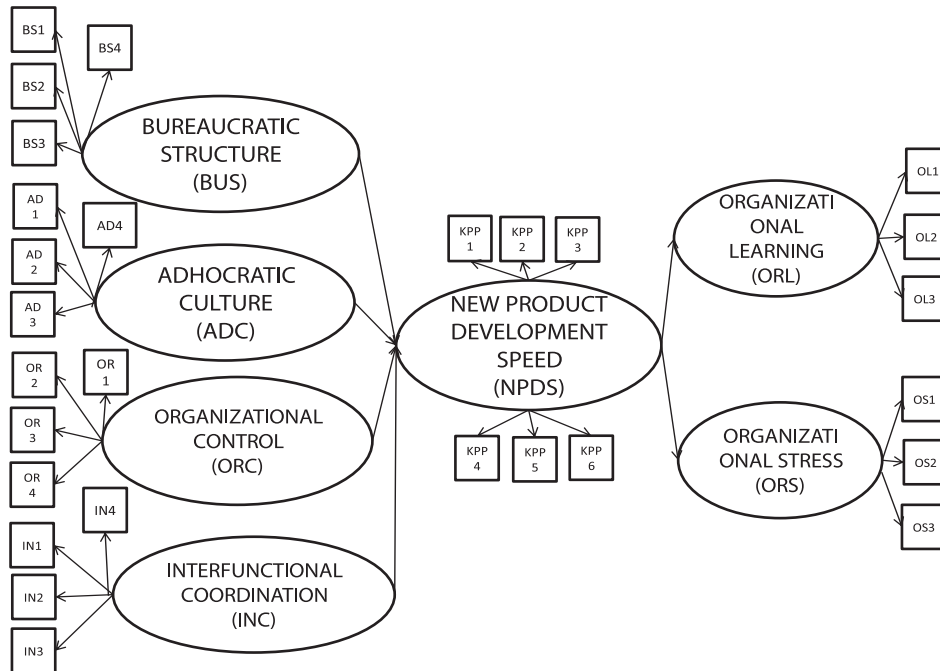


Figure 3. Research structural model

Table 4. Results of Indicator Test (Measurement Model) of Construct Reliability
CONSTRUCT RELIABILITY CALCULATION

Latent Variable	Obs. Var.	FL	Amount	(amount) ²	Error Var		Amo2+Err	CR
BUREAUCRATIC STRUCTURE	BS1	0.77			0.40			
	BS2	0.77			0.41			
	BS3	0.92			0.16			
	BS4	0.52	2.98	8.8804	0.73	1.70	10.5804	0.84
ADHOCRATIC CULTURE	AD1	0.59			0.66			
	AD2	0.74			0.45			
	AD3	0.84			0.29			
	AD4	0.50	2.67	7.1289	0.75	2.15	9.2789	0.77
ORGANIZATIONAL CONTROL	OR1	0.57			0.67			
	OR2	0.51			0.74			
	OR3	0.83			0.30			
	OR4	0.71	2.62	6.8644	0.49	2.20	9.0644	0.76
INTERFUNCTIONAL COORDINATION	IN1	0.59			0.65			
	IN2	0.77			0.40			
	IN3	0.95			0.09			
	IN4	0.95	3.26	10.6276	0.10	1.24	11.8676	0.90
PRODUCT DEVELOPMENT SPEED	KPP1	0.39			0.85			
	KPP2	0.43			0.82			
	KPP3	0.71			0.49			
	KPP4	0.50			0.75			
	KPP5	0.57			0.67			
	KPP6	0.56	3.16	9.9856	0.68	4.26	14.2456	0.70
ORGANIZATIONAL LEARNING	OL1	0.92			0.16			
	OL2	0.91			0.17			
	OL3	0.68	2.51	6.3001	0.54	0.87	7.1701	0.88
ORGANIZATIONAL STRESS	OS1	0.66			0.56			
	OS2	1.07			-0.15			
	OS3	0.77	2.50	6.2500	0.41	0.82	7.0700	0.88

Referring to the results of the fit tests (Table 4 and Table 5), the reliability and validity of the research model's construct meet the requirements except for the PDS1 and 2, viz. "product development time is shortened so that more products can be released to the market"

and "more innovations are made to improve existing products."

The researcher managed to obtain 61 completed questionnaires that are ready to be processed using LVS of SEM 8.8.

Tabel 5. Results of Indicator Test (Measurement Model) of Construct Validity

VARIANCE EXTRACTED CALCULATION								
Latent Variable	Obs.Var.	FL	FL 2	AMOUNT	Error Var		Amo2+err	VE
BUREAUCRATIC	BS1	0.77	0.5929		0.40			
STRUCTURE	BS2	0.77	0.5929		0.41			
	BS3	0.92	0.8464		0.16			
	BS4	0.52	0.2704	2.3026	0.73	1.70	4.0026	0.58
	ADHOCRATIC	AD1	0.59	0.3481		0.66		
CULTURE	AD2	0.74	0.5476		0.45			
	AD3	0.84	0.7056		0.29			
	AD4	0.50	0.2500	1.8513	0.75	2.15	4.0013	0.46
	ORGANIZATIONAL	OR1	0.57	0.3249		0.67		
CONTROL	OR2	0.51	0.2601		0.74			
	OR3	0.83	0.6889		0.30			
	OR4	0.71	0.5041	1.7780	0.49	2.2	3.9780	0.45
	INTERFUNCTIONAL	IN1	0.59	0.3481		0.65		
COORDINATION	IN2	0.77	0.5929		0.40			
	IN3	0.95	0.9025		0.09			
	IN4	0.95	0.9025	2.7460	0.10	1.24	3.986	0.69
	PRODUCT	KPP1	0.39	0.1521		0.85		
DEVELOPMENT	KPP2	0.43	0.1849		0.82			
	KPP3	0.71	0.5041		0.49			
	KPP4	0.50	0.2500		0.75			
	KPP5	0.57	0.3249		0.67			
	KPP6	0.56	0.3136	1.7296	0.68	4.26	5.9896	0.29
	ORGANIZATIONAL	OL1	0.92	0.8464		0.16		
LEARNING	OL2	0.91	0.8281		0.17			
	OL3	0.68	0.4624	2.1369	0.54	0.87	3.0069	0.71
	ORGANIZATIONAL	OS1	0.66	0.4356		0.56		
STRESS	OS2	1.07	1.1449		-0.15			
	OS3	0.77	0.5929	2.1734	0.41	0.82	2.9934	0.73

Table 6. Results of Fit-test to All Models

Indicator	Score	Requirement	Description
Chi-Square	P=0.00, df: 9	The lesser Chi-Square score, the better	P=0.00 < 0.05 <i>Marginal Fit</i>
RMSEA	0.0(Conf.interval: 90%); Pvalue; 1.00	≤ 0.08: <i>good fit</i> ≤ 0.05: <i>close fit</i>	<i>Good Fit</i>
ECVI (Model)	0.81	ECVI < ECVI (Saturated Model)	1.78 < 1.98 = <i>Good Fit</i>
ECVI (Saturated)	0.97	= <i>good fit</i>	ECVI model is closer to ECVI Saturated model
ECVI (Independence)	4.48		than to ECVI Independence model: <i>Good Fit</i>
AIC (Model)	38.26	AIC Model < AIC (Saturated Model)	189.14 < 210.00 = <i>Good Fit</i>
AIC (Saturated)	56	= <i>good fit</i>	AIC model is closer to AIC Saturated model
AIC (Independence)	282.07		than to AIC Independence model: <i>Good Fit</i>
NNFI	1.09	≥ 0.90 : <i>good fit</i> 0.80 ≤ NNFI ≤ 0.90: <i>marginal fit</i>	<i>Good Fit</i>
NFI	1.00	≥ 0.90 : <i>good fit</i> 0.80 ≤ NNFI ≤ 0.90: <i>marginal fit</i>	<i>Good Fit</i>
IFI	1.04	≥ 0.90 : <i>good fit</i> 0.80 ≤ IFI ≤ 0.90: <i>marginal fit</i>	<i>Good Fit</i>
RFI	1.00	≥ 0.90 : <i>good fit</i> 0.80 ≤ RFI ≤ 0.90: <i>marginal fit</i>	<i>Good Fit</i>
RMR	0.0073	≤ 0.05: <i>good fit</i>	<i>Good Fit</i>
GFI	1.00	≥ 0.90 : <i>good fit</i> 0.80 ≤ GFI ≤ 0.90: <i>marginal fit</i>	<i>Good Fit</i>

Research Structural Model Analysis

• Fit-Test Results of All Models

Analysing the fit-test results of all models (Table 6), the researcher concludes that the fit between the data and the models is good.

• Hypothetical Test of Research Model

The hypothetical test is carried out by referring to significance level requirement of 0.05 or 5% with t-value of $t \geq 1,96$ (Wijanto, 2005) as the guidance. LVS processing results are shown in Figure 4 and hypothetical test results are shown

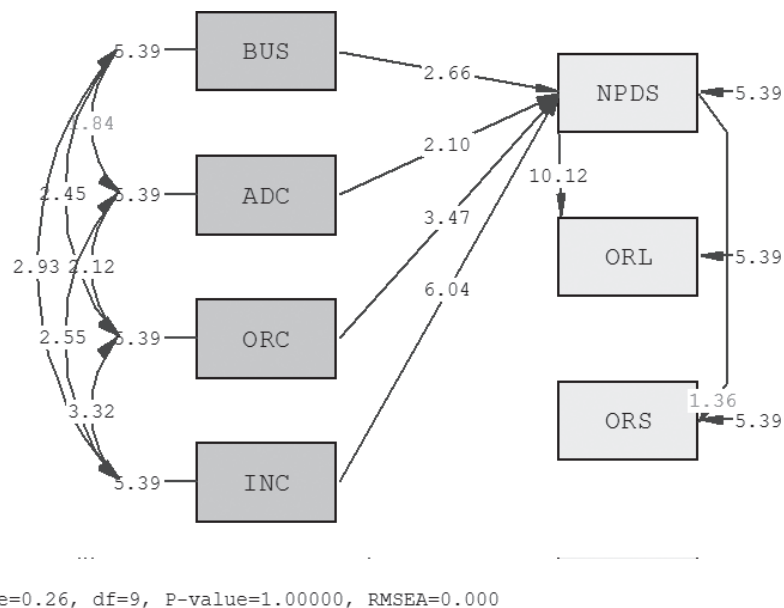


Figure 4. LVS Processing Result: T-Value

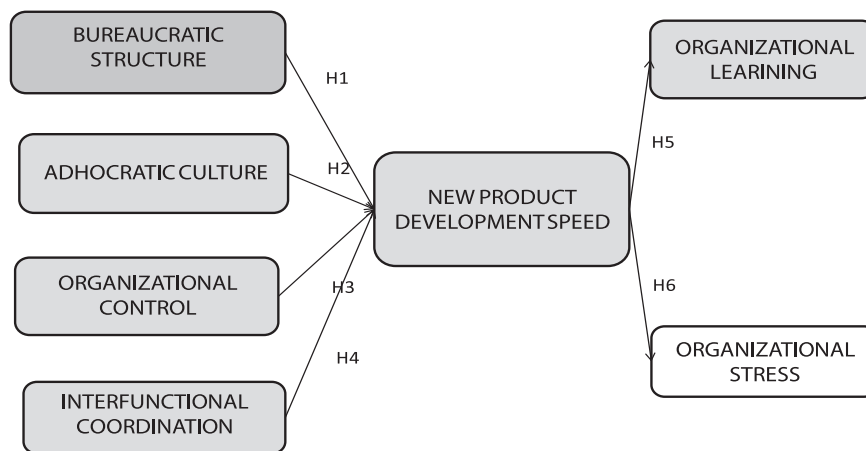


Figure 5. Illustration of research findings

in Table 7.

LVS processing results (Figure 4) are concluded in Table 7.

The aforementioned research findings can be illustrated as shown in Figure 5.

Discussion

• Infrastructural Antecedents of NPD Speed

Research findings indicate that the infrastructural antecedents proved to influence product development speed are bureaucratic structure and adhocratic culture. Bureaucratic structure is proved to have a negative impact on product development speed. These findings confirm the statement of Kohli & Jaworski (1990) that bureaucratic structure is very likely to have a negative impact on product development speed. It is strongly assumed that these refer to the cen-

tral and structural formal levels that inhibit fast distribution and effective use of information, whereas the speed at which information is distributed and effectively used is the critical determinant of product development speed. Such research findings also show that adhocratic culture influences positively the product development speed. Adhocratic culture is characterized by organic process, namely an organizational culture that is flexible, spontaneous, and focused on external elements (Desphande, 1993). These research findings provide an additional insight that companies wanting to be successful in product development speed should pay attention to their organizational culture.

• Procedural Antecedents of NPD Speeds

Research findings show that Organizational Control dan Interfunctional Coordination are

Table 7. Hypothetical Test Results

Hypothesis	Structural Path	t-val	Std. Coeff.	Description	Conclusion
H1	BUS → NPDS	2.66	0.20	Data supports hypothesis	Bureaucratic Structure has a negative impact on Product Development Speed
H2	ADC → NPDS	2.10	0.15	Data supports hypothesis	Adhocratic Culture has a positive impact on Product Development Speed
H3	ORC → NPDS	3.47	0.27	Data supports hypothesis	Organizational Control has a positive impact on Product Development Speed
H4	INC → NPDS	6.04	0.50	Data supports hypothesis	Interfunctional Coordination has a positive impact on Product Development Speed
H5	NPDS → ORL	10.12	0.80	Data supports hypothesis	Product Development Speed has a positive impact on Organizational Learning
H6	NPDS → ORS	-1.36	0.18	Data doesn't support hypothesis	Product Development Speed doesn't influence positively Organizational Stress

proved to have a positive impact on product development speed. Organizational Control provides workers with timing certainty in the cycle of new product development speed (NPD). Formal and informal controls as the mechanisms in Organizational Control also help workers to remain on the same track as that of the organization so that they can achieve efficiency in NPD (Kessler & Chakrabarti, 1996). Interfunctional coordination factor has also a strong connection with faster product development. This is in accordance with research findings of Sethi (2000) showing that interfunctional coordination helps functional areas to realize the benefits of participation in cross-functional activities that are carried out more often in product development speed.

• Internal Performance Outcomes of NPD Speed

Research findings indicate that product development speed has a positive impact on organizational learning, as stated by Meyer (1993) that product development speed provides an opportunity for an organization to learn more than its competitors. Accelerated product development projects will encourage all involved levels in an organization to provide inputs more often (Meyer, 1993). The findings also show that product development speed does not have a positive impact on organizational stress. These provide an insight that in accelerated product development, workers who are required to carry out the same tasks with shorter time than before will have a negative impact on organizational stress, which refers to the dysfunctionality and distress of individuals and organization at the same time due to conditions or events

already set in the organization (Flaherty, et al. 1999; Singh, 1998). Companies should pay close attention to this so as to apply product development speed only to individuals who are able to bear the pressure of short time. As revealed by Nijssen, et al. (1995), speed-up, i.e. accelerating all activities in product development, should be supported by human resource allocation and training to maintain effectiveness.

Conclusion

The research findings confirm that infrastructural antecedents (bureaucratic structure and adhocratic culture) influence NPD Speed and procedural antecedents (organizational control and interfunctional coordination) influence NPD Speed. Research findings also confirm that NPD Speed has positive impact in internal performance outcomes (organizational learning) but has not had any positive impacts on organizational stress.

Research Limitations

The results of research on 61 respondents have not yet portrayed the product development speed in food industry in general in Indonesia. Further research will need more samples to improve research findings. Time limitation also contributes to the number of respondents. To complete the findings, an explorative study may be carried out to further explore the antecedent factors of product development speed in Indonesia in respect of structure, culture, control, coordination, learning process, and organizational stress, which in turn will improve or support the six propositions offered by Menon & Lukas (2004).

Future Research

This research should be followed up by completing the results of hypothetical tests with antecedent and outcome variables gained from various explorative studies in Indonesia.

The research can also be extended to other industries, such as electronic and automotive industries which are strongly believed to apply product development speed as well due to the increasing competitions at this time.

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