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Assesment of Innovation Process Capability-Based on Innovation Value Chain Model in East Java Footwear Industry

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Abstract. *This study attempts to assess the innovation process based on innovation value chain model in footwear industry in East Java, Indonesia. A strength and weakness mapping analysis was performed and it included three factors related to company characteristics: operation scale based on number of employees, operational priod, and market orientation. The samples were 62 footwear industries, members of East Java Indonesian Footwear Association (Aprisindo). The questionnaire was sent via email. Thirty industries (48.38%) sent the questionnaire back. A focus group discussion (FGD) was conducted with several representatives from footwear industry before the questionnaire was sent. The study found that companies are relatively good at idea conversion (42,30%) but the companies have a little difficulties at diffusion (50,80%) and at idea generation (55,80%). From the result respose show (see table.2) that the weakest links (the innovation process bottleneck) is cross-pollination activity [in which the people typically don't collaborate on projects across units, businesses, or subsidiaries (88,6%)], while the strongest links is selection activity [the companies have a risk- averse attitude toward investing in novel ideas (39,3%)]. Based on p-value, the study found that company characteristics influencing a certain phase of innovation value chain significantly were company period (age of company) and market orientation. Specifically, both of them influenced idea generation phase.*

Keywords: *Innovation process capability, Innovation value chain, footwear industry, company characteristics, strength and weakness evaluation*

1. Introduction

The world of business and industry is currently facing new order as characterized by hyper-competition, fast-changing technology, shortened product life cycle, and dynamic business environment (O'Regan and Ghobadian, 2005; Wang et al, 2008; Rejeb et al, 2008; Ishak et al, 2014; Hossein et al, 2013). In such situation, several studies concluded that innovation-related activities is a key factor in topping the competition (Dervitsiotis 2010; Johanessen and Olsen, 2009; Ren et al, 2010). Other research also showed that innovation is an essential factor for companies to keep their competitiveness and to increase growth significantly (Abidin et al, 2011; Chesbrough, 2003; EU European Commission, 2004, Dervitsiotis 2010, Gamal, 2011, Mohd Nizam et al, 2015).

On the other hands, in several cases, innovation did not affect companies' competitiveness significantly (Ahmed, 1998). Several studies analyzed the ineffectiveness of the innovation process and found that it was driven by a lack in innovation process management, starting from idea pitching to product commercialization (EU European Commission, 2004; Salerno et al, 2015; Kemp et al, 2003; Van der Panne et al, 2003; Tidd and Bessant, 2009). These studies highlight the point that innovation process is an important and determining factor to increase innovation effectiveness in a company. Hansen and Birkinshaw (2007) stated that innovation process, similar to business or production

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process; needs to be effectively managed in order to maintain and increase the quality, production speed, and productivity. Several studies found that assessment process and innovation process capability evaluation performed continuously as well as making the assessment a base to manage the innovation process effectively will benefit company in terms of competitiveness (Gupta et al, 2007; Tidd and Bessant, 2009; Ishak et al, 2014).

There are various research and studies using different models focusing on innovation process capability monitoring and evaluation. A literature study showed that innovation value chain model developed by Hansen and Birkinshaw (2007) is the most frequently used model and has distinctive strength compared to other models (Ishak et al, 2014; Taghizadeh et al, 2014; Solerno et al, 2015). However, one of the drawbacks in using innovation value chain model is the lack of company characteristics as a variable, such as organizational structure, human resources, form of work appraisal, and information system (Salerno et al, 2010).

The application of innovation value chain model as developed by Hansen and Birkinshow focuses limitedly on multinational company with big scale industry (Salerno et al, 2015). On the other hand, Fontana in his research (2013) on 39 government companies in Indonesia using input, process, and output (IPO) method concluded there is a positive effect of innovation input on innovation value chain model implementation. His research stressed that innovation process evaluation using innovation value chain model needs a clear picture on how idea is transformed into commercially sound product as an integrated process involving various factors, one of them is company characteristics. This study attempts to perform an assessment of innovation process capability based on innovation value chain model as developed by Hansen and Birkinshaw in footwear industry in East Java, Indonesia. The strength and weakness of innovation activities along the innovation value chain was mapped, inputting three company characteristics as a variable: business or operation scale based on number of employees, operational time, and market orientation. This study aims to assess innovation process capability by observing and identifying the weakest and strongest links of innovation activities along the innovation value chain and testing the difference of innovation process capability with different company characteristics.

Footwear industry was chosen because it is one of strategic and most prominent industries in Indonesia. It is one of top export commodities and it contributes significantly to Indonesian income (Khair, 2014). In recent years, the export value of Indonesian footwear product experiences a considerable decline. It is caused by decrease in competitiveness and tight competition with similar industries in other Asian countries, such as India and China (Ragimun, 2014). Extensive effort in increasing industrial competitiveness is being conducted, specifically in East Java, Indonesia, in which footwear industry is selected as one of priority industry to face ASEAN Economic Community 2015 (kemenperin.go.id).

2. Literature Review

2.1. Innovation Process and Innovation Value Chain

Innovation process capability plays an important role in various research focusing on innovation (Roman et al, 2011). The significance of innovation process in a company has been underlined by previous studies (Hansen and Birkinshaw, 2007; Roper et al, 2006; Utterback, 1994; Li, Zhao & Liu, 2006; Clark and Fijimoto, 1991). Gupta et al (2007) established that company depends on innovation process to increase their competitiveness.

Several concepts and models have been a focus for several researchers. Utterback (1971) found that innovation process is a managerial process consisting of main activities, i.e. idea generation, problem solving, invention, implementation, and diffusion; in order to create major economical impact.

Basically, innovation process in a company can be viewed as a cluster of activities in an innovation value chain model. Several studies described main activities classification in innovation value chain as follows: stage gate model with 5 steps innovation value chain process (Copper, 1988), 4 steps innovation value chain (Sundbo,1997), 3 steps and 6 activities innovation value chain (Hansen & Birkinshaw, 2007). With increase in the role of knowledge in innovation process, Roper and coworkers (2008) included the knowledge production function in the innovation value chain approach. They declared 3 steps innovation value chain: accessing knowledge, building innovation, and commercializing innovation. Goffin and Mitchell (2010) developed pentathlon model with 5-steps process, while Management Center Consultant (2011) adopted 7 steps process value chain concept from a Harvard study. Recent studies focused on innovation process using innovation value chain as developed by Hansen and Birkinshaw.

The advantage of this model is on its comprehensive framework with 3 steps innovation value chain: ideation, conversion, and diffusion; and its 6 innovation activities: internal sourcing, cross-unit sourcing, external sourcing, selection, development, and company-wide spread of the idea. This framework allows company leaders to have comprehensive view of the whole steps and activities in innovation value chain, enabling them to diagnose and assess the innovation process in a fast way. In general, various innovation value chain models describing innovation process have the orientation of the linear process from product development or new process activities (Solerno et al, 2015)

In the context of innovation management, to improve company ability to develop new process or product, company leaders need pertinent information related to its innovation process capability status. The information includes how company strength and weakness can be properly identified in order to develop improvement for its innovation process capability (Hansen & Birkinshaw, 2007).

Neely and Hii (1998) concluded that internal innovation process capability is one of three important factor in determining innovation capacity of a certain company to develop new product or process. On the other hand, Hansen and Birkinshaw (2007) asserted that similar to business or production process, innovation process needs to be effectively maintained in order to improve innovation quality, speed, and productivity. Several studies concluded that innovation process capability evaluation and assessment performed continuously as well as design it as a base in managing innovation process effectively will induce a significant impact in improving company competitiveness (Gupta et al, 2007; Tidd and Bessant, 2009; Ishak et al, 2014). In a wider context, mapping and analysis on process value chain is a starting key in achieving the effectiveness of process management (IMA, 1996).

A number of research and studies related to innovation process capability evaluation and assessment using various models has been conducted, e.g. diamond model (Tidd et al, 2005), Funnel Model (Gamal et al, 2011, Lamgdon Moris, 2008), Innovation Value Chain Model (Gunday, Ulusoy, Kilic & Alpkan, 2011; Wang, 2011; Hansen and Birkinshaw, 2007; Roper et al, 2006; Ishak et al, 2014; Seyedeh et al, 2014;). dan Oslo manual model (Oslo Manual, 2005). Salerno and coworkers (2015) stated that innovation value chain model developed by Hansen and Birkinshaw is a more comprehensive model focusing on innovation process and its management. This model integrated a relatively closed conventional model with wider approaches, particularly in relation to decision making. On the other hand, this innovation value chain model is equipped with measurement instrument as a diagnostic tool for the company to assess its innovation process capability (Hansen and Birkinshaw, 2007). A description of innovation value chain model as developed by Hansen and Birkinshaw is displayed in Figure 1.

	IDEA GENERATION			CONVERSION		DIFFUSION
	IN-HOUSE Creation within a unit	CROSS-POLLINATION Collaboration across units	EXTERNAL Collaboration with parties outside the firm	SELECTION Screening and initial funding	DEVELOPMENT Movement from idea to first result	SPREAD Dissemination across the organization
KEY QUESTIONS	Do people in our unit create good ideas on their own?	Do we create good ideas by working across the company?	Do we source enough good ideas from outside the firm?	Are we good at screening and funding new ideas?	Are we good at turning ideas into viable products, businesses, and best practices?	Are we good at diffusing developed ideas across the company?
KEY PERFORMANCE INDICATORS	Number of high-quality ideas generated within a unit.	Number of high-quality ideas generated across units.	Number of high-quality ideas generated from outside the firm.	Percentage of all ideas generated that end up being selected and funded.	Percentage of funded ideas that lead to revenues; number of months to first sale.	Percentage of penetration in desired markets, channels, customer groups; number of months to full diffusion.

Figure 1. Innovation value chain model framework (Hansen and Birkinshaw, 2007)

Based on the model shown in Figure 1, there are three steps in innovation value chain: ideation, conversion, and diffusion; as well as 6 innovation activities: internal sourcing, cross-unit sourcing, external sourcing, selection, development, and company-wide spread of the idea. Idea generation as the first step is a mechanism to facilitate idea search from internal and external sources.

The second step of this innovation value chain is the idea selection and development to convert the ideas into a product, service, or process for the company. It is possible that this process is the bottleneck for the company when unsuitable decision is made. Roper and coworkers (2008) found that in this step, multi-skilled teamwork is necessary. Besides, the managers need to consider a proper decision making process in determining a budget for new idea (Hansen & Birkinshaw, 2007).

There are two types of company policy in selection and budgeting process which can play a role in the failure of idea conversion into products (Ihsanuddin, 2009): (1) company with strict budgeting policy and conventional management mindset and (2) company with less strict policy in its idea selection process. The company executes a number of projects to convert the idea with various qualities without tight selection. It also means a project may be conducted with sufficient resources. A company could also lose its sensitivity to determine which initiative is related to company strategies. On the other hand, there also companies choosing not to convert any ideas because they lack focus and too occupied by other activities.

After idea selection and development process, the next step is diffusion process. Using this approach, the management could obtain two important understandings to help them improving innovation in the company. First, the best innovation process capability in the company that could be achieved is limited on the weakest chain link in innovation value chain. The management needs to identify the weakest link in the company to increase and improve its innovation as well as determine a solution focused on the weakest link and not others. Secondly, the strongest link in innovation value chain can also be a weakness since the management tends to emphasize on the link, making it worse (Ihsanuddin, 2009). On the other hand, this diffusion process is also significantly affected by company focus in establishing its brand strength and reputation (Roper, Du & Love, 2006).

Related to the identification of strength and weakness in innovation value chain, there are company profiles as observed from the weakest innovation value chain step (Ihsanuddin, 2009):

(1) *The idea-poor company*, in which the main problem is located on the idea mining and not its execution. Company needs a significant amount of time to develop and spread the idea but the result, in terms of product or investment return, does not reflect the effort.
(2) *The conversion-poor company*, in which the company has numerous ideas but is not able to filter and develop the ideas well. It often occurs that the idea fails in budgeting steps because the company chooses an incremental innovation with well measured risk. This type of company needs an improvement in doing idea screening and not on the mining process.
(3) *The diffusion-poor company*, in which the company has the difficulty in marketing the developed product, not the idea mining and development

In overall, the innovation process capability assessment using identification of activity strength and weakness in the aforementioned value chain still lacks of company characteristics as a determining factor in innovation value chain performance. Salerno and coworkers (2010) established that innovation process capability evaluation using innovation value chain overlooks the role of company characteristics, such as organizational structure, human resources, and appraisal system, as an input in supporting the activity performance. On the other hand, the application of innovation value chain model with the framework developed by Hansen and Birkinshaw focuses more on multinational company with a large scale of business (Salerno et. al., 2015).

This condition has not been able to answer the question on how the overview of strength and weakness of value chain activity will differ when the company characteristics are diverse. A number of research has been conducted to observe how company characteristic may affect innovation value chain activity and overall innovation management. Fontana, in his research in 2013, studied 39 government companies in Indonesia with Input, Process, and Output (IPO) method and concluded that there is a positive effect of innovation input on innovation value chain performance.

2.2. Innovation process capability and Business scale

There are several studies performed to see the effect of company characteristics on the innovation value chain activity and overall innovation management (Schmidt, 2010; Love et al. 2010; Laforet, 2008; Bertschek and Entorf, 1996; Laforet and Tann, 2006; Avermaete et al, 2003). Those studies concluded that there is a difference in innovation performance with different scale of business. Laforet and Tann (2006) studied the effect of business scale of manufacturing companies on their ability to perform innovation activities. Their study showed that companies with large scale of business displayed better ability in their innovation process, as well as success in entering new market. The main reason was their capacity to invest in new technology and equipments as well as the ability to provide and train highly qualified employee.

In another study, Avermaete and coworkers (2003) found that companies with small and medium scale of business possess insufficient knowledge in conducting R&D activities so they have difficulties in converting and developing the ideas into an effective innovation. Schmidt (2005) stated that business scale affects company effort in developing ideas from external sources. Companies with large business scale tend to use their own resources. White and coworkers (1988) found there was a difference in innovation activity performance with different business scale. Companies with small business scale have the advantage on its owner's individual strength, while big companies have better resources and system. Cao and coworkers (2004) in their study in furniture manufacturing company in China discovered a difference in innovation ability with different business scale (small: 0 – 100 employee, medium: 1010 – 250, and big: >250). They found that, in general, big scale companies have greater innovation ability compared to medium and small scale companies. Hansen and Birkinshaw (2007) analyzed that small scale companies have more advantage in ideation process, particularly in internal sourcing, while big companies have more strength in diffusion step. This study attempts to test the difference in strength and weakness of innovation value activity in footwear industry with different business scale.

2.3. Innovation process capability and Operational period

Research about operational period or time of a company in relation with its innovation performance has been conducted by several researchers (Love et al. 2010; Hui et al, 2013; Hansen, 1992; Huergo and Jaumandreu, 2004; Coad et al , 2013; Balasubramanian et al, 2008). The conclusion is that resources and internal capacity of a company such as operational period had an effect to innovation activity. Hansen (1992) declared that operational period of a company affected a company's innovation level and output. Huergo and Jaumandreu (2004) also found the ability of a company to innovate changed as its operational period continued. Longer operational period tends to help a company collect learning to support its innovation activity. Balasubramanian also supports the statement.

The aforementioned research analyzed the effect of operational period of a company to its overall innovation performance. Detail study on the effect of operational period on each innovation value chain has yet to be conducted. In this study, the effect of different operational period of footwear industry on innovation value chain activity will be investigated.

2.4.Innovation process capability and Market Orientation

When it comes to market orientation, a number of studies on the correlation between market orientation and innovation performance of company have been published (Cao et al, 2004; Bernard et al, 2007; Lopez, 2005; Ozsomer et al, 1997). Cao and coworkers (2004) in their study in a furniture manufacturing companies in China found that there is a difference in innovation performance with different market orientation. They discovered that companies focusing solely on export or import market had less ability in performing innovation compared to companies with diverse market orientation. Ozsomer and coworkers (1997) concluded that there was a difference in innovation ability between companies with different market orientation. In general, companies focusing on export marker have more proactive, aggressive, and competitive strategies. This condition is the supporting factor for the companies to di continuous development in their products and their production method. However, the specific effect of market orientation on innovation value chain has not been explored and it will be performed in this study, specifically in footwear industry.

3. Research Methodology

This study is a survey research involving three steps:

1) Designing instrument for data harvesting. A two-part questionnaire was created. The first part was aimed to collect date related to company characteristics, while the second part was adopted from innovation value chain evaluation in an organization as developed by Hansen and Birkinshaw (2007). The second part questionnaire is shown in Figure 2. The function of the second part was to collect date related to strength and weakness of each activity and step in innovation value chain.
2) Data collection. The samples were 62 footwear industries, members of *East Java Indonesian Footwear Association (Aprisindo)*. The questionnaire was sent via email. Thirty industries (48.38%) sent the questionnaire back. Most of the respondents were company leaders, such as plant manager, general manager, and production manager. A focus group discussion (FGD) was conducted with several representatives from footwear industry before the questionnaire was sent. The FGD aimed to explain and discuss the objectives of the study.
3) Data processing and analysis. In this stage descriptive statistics analysis, strength and weakness of innovation value chain analysis, and multivariate analysis of variance (MANOVA) were employed in this study. Descriptive statistics analysis was chosen to describe the demography of respondent influencing the innovation value chain. The demography data were company characteristics consisting of number of employees, age of company (operational period) and market orientation. Furthermore, statistics analysis would aid analysis of other results. Then, further data processing were strength and weakness of innovation value chain analysis, and MANOVA. Detailed discussion of them would be showed in result and discussion.

	Completely Disagree	Disagree	Neither Disagree nor Agree	Agree	Completely Agree	Activity	Phase
1. Our culture makes it hard for people to put forward novel ideas	1	2	3	4	5	In-house idea generation	High scores indicate thatbyour company may be an idea poor company
2. People in our unit come up with very few good ideas of their own	1	2	3	4	5		
3. Few of our innovation project involve team members from different units or subsidiaries	1	2	3	4	5	Cross-pollination among businesses	
4. Our people typically don't collaborate on projects across units, businesses, or subsidiaries	1	2	3	4	5	External sourcing of ideas	
5. Few good ideas for new new products and business come form outside the company	1	2	3	4	5		
6. Our people often exhibit a " not invenred here' attitude- ideas from outside aren't considered as valuable as those invented within	1	2	3	4	5	Selection	High scores indicate thatbyour company may be an conversion poor company
7. We have tough rules for investment in new projects- it's often too hard to get ideas funded	1	2	3	4	5		
8. We have a risk- averse attitude toward investing in novel ideas	1	2	3	4	5	Development	
9. New product development project often don't finish on time	1	2	3	4	5		
10. Managers have a hard time getting traction developing new businesses	1	2	3	4	5	Diffusion	High scores indicate thatbyour company may be an diffusion poor company
11. We're slow to roll out new products and businesses	1	2	3	4	5		
12.Compatitors quickly copy our product introductions and often make preemptive launches in other countries	1	2	3	4	5		
13. We don't penetrate all possible channels, customer groups, and regions with new products and service	1	2	3	4	5		

Source: the authors, based on Birkinshaw (2007)

Figure 2. Questionnaire of innovation value chain evaluation (adoptep from Hansen and Birkinshaw)

4. Result and Discussion

4.1. Descriptive analysis

Based on descriptive analaysis of 30 observed companies, the obtained data for number of employees was 13.33% of company employing less than 100 people, 3.33% of employing 101-300 people, 16.67 % of employing 301-500 people, 26.68% of employing 501-700 people and 40% of employing more than 700 people. Easing to compare the number, the information was graphically presented as Figure 3.

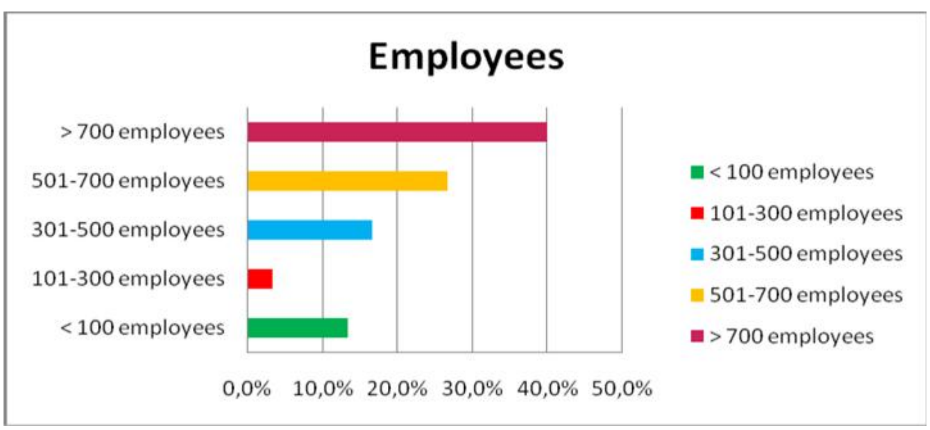

Figure 3. Number of employees

In case that large industry was defined as company employing more than 100 people and medium-small industry was defined as opposite (Cao et al, 2004), the obtained information was 86.67% of observed companies belonged to large company.This number of employees was suspected to be able to influence innovation value chain of company. Probably the larger number of employees were employed, the more chance of innovatioan idea would be generated and would be easily realized. Surely, this allegation should be tested by using MANOVA. Besides number of employees, age of company (operational period) was the other suspected factor influencing innovation value chain. Based on this allegation, data of respondent would be indentified based on age of company and it was obtained that 16.67% of company aged less 5 years, 10% of aged 6-10 years, 6.67% of aged 11-15 years, 16.67% of aged 16-20 years, and 50% of aged more than 20 years. Data showed that the majority of observed companies (73%) were companies experienced in footwear industry for more than 10 years. Obviously, it was showed in Figure 4.

Meanwhile, the data of market orientation obtained from 30 repondents comprised 20% of domestic-oriented companies, 20% of export-oriented companies and 60% of domestic and export-oriented companies. Then, the domestic and export-oriented would be mentioned as mix-oriented. This market orientation was suspected to be able to influence innovation value chain. Furthermore, these three of input factors should be tested whether the allegation was statistically proved. Graphically, descriptive statitics of market orientation was presented in Figure 5.

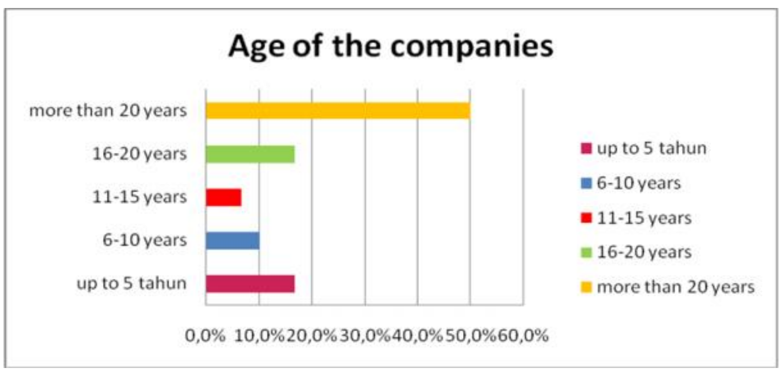

Figure 4. Age of the companies

Figure 5. Range of Age

4.2. Comprehensive strength and weakness of innovation value chain analysis

Since the demographic of observed companies had been presented, the further data processing was strength and weakness of innovation value chain analysis. This analysis aimed to understand of companies' situation regarding to innovation value chain. The companies' situation was explored by answering the questionnairre consisting of statements related to innovation value chain activities. The aforementioned activities were in-house idea generation, cross-pollination among businesses, external sourcung of ideas, selection, development, and diffusion. The questionnairre was designed by refering to figure 2. Every respondent was asked to give agreement for each given statement in likert scale of 1 to 5. The larger scale represented the stronger agreement meaning that the statement was suitable with respondent's situation. After collecting the data, total score calculation of each statement was conducted. At the rest, aforementioned total score would contribute the total score of innovation value chain of observed companies. The calculation of total score was conducted by using weighted sum of likert scale given by 30 respondents. Percentage calculation was coducted as well to aid doing interpretation among the statements. Maximum score was achieved by multiplying the maximum likert scale (5) and the number of respondent (30). Therefore the maximum score achieved was 150. The example of calculation given was explained as followed.

Table 1. Footage of Data Collecting

Statement	**Likert Scale**				
	Completely Disagree (1)	**Disagree (2)**	**Neither Disagree nor Agree (3)**	**Agree (4)**	**Completely Agree (5)**
Our culture makes it hard for people to put forward novel ideas	4	11	9	4	2

Table 1 showed that 30 respondents consisted of 4 people answering 1 or completely disagree, 11 people answering 2 or disagree, 9 people answering 3 or neither disagree nor agree, 4bpeople answering 4 or agree and 2 people answering 5 or completely agree. Based on those data, total score calculation was conducted by weighted sum such as followed.

Total score = (1x4) + (2+11) + (3+9) + (4x4) + (5+2) = 79

Therefore, the percentage for first statement was 79/150 equaled to 52,6%. By doing the same way dor each statement, total scores of all statement was presented on table 2.

Based on table 2, the condition of observed companies regarding to activities related to innovation value chain was known. The highest total score was 88,6% indicating that employee typically did not collaborate on projects across units, businesses, or subsidiaries in doing innovation process. This phenomenon revealed that innovation function was imposed to a certain function or unit. Meantime, the lowest total score was 39,3% indicating that company considered about the risk arised due to new idea. Considering the risk revealed that there was any doubt of successful in implementing the new idea. In some cases, company often preferred waiting for the competitor to do the innovation and traced it fast. Therefore, the feared risk had been learned. This analysis was reinforced by total score of statement 12 which obtained 66%.

Table 2. Total score of statement regarding to activity

Statement	Total score	% out of Maximum score	Activity	Phase
1. Our culture makes it hard for people to put forward novel ideas	79	79/150 =52,6%	in-house idea generation	High scores indicate that companies may be idea-poor
2. People in our unit come up with very few good ideas of their own	78	78/150 = 52%		
3. Few of our innovation project involve team members from different units or subsidiaries	61	61/150 = 40,6%	Cross-pollination among businesses	
4. Our people typically don't collaborate on projects across units, businesses, or subsidiaries	133	133/150 = 88,6%		
5. Few good ideas for new new products and business come form outside the company	77	77/150 = 51,3%	External sourcing of ideas	
6. Our people often exhibit a " not invenred here' attitude-ideas from outside aren't considered as valuable as those invented within	75	75/150 = 50%		
7. We have tough rules for investment in new projects- it's often too hard to get ideas funded	63	63/150 = 42%	Selection	High scores indicate that companies may be conversion-poor
8. We have a risk- averse attitude toward investing in novel ideas	59	59/150 = 39,3%		
9. New product development project often don't finish on time	70	70/150 = 46,6%	Development	
10. Managers have a hard time getting traction developing new businesses	62	62/150 = 41,3%		
11. We're slow to roll out new products and businesses	63	63/150 = 42%	Diffusion	High scores indicate that companies may be

Statement	Total score	% out of Maximum score	Activity	Phase
12.Compatitors quickly copy our product introductions and often make preemptive launches in other countries	99	99/150 = 66%		Diffusion-poor
13. We don't penetrate all possible channels, customer groups, and regions with new products and service	67	67/150 = 44,6%		

Refering to figure 2, every statement was used to explore a certain activity related to innovation value chain. So that, the statement's total score should be unified with others statement's total score into certain activity measured. Therefore, the total score of each activity related to innovation value chain would be showed. Furthermore, company was able to prioritize controling activities in terms of innovation value chain improvement based on the obtained total score. Its score was obtained by summing the certain statement's total scores up. Since, activities were explored by different number of statements, the percentage calculation should be conducted to make them comparable. The example of calculation given was total score calculation for idea generation explored by statement 1 and 2. The score of 157 was obtained by summing 78 and 79. Likewise, the maximum score was obtained by summing 150 and 150. Therefore, the percentage obtained for idea generation was 157/300=52,3%. By using the same way, the obtained total score for others activites was presented on Table 3.

Table 3. Total score of activities related to innovation value chain

<table>
<tr><th>IVC Activity</th><th>Total Score</th><th>% out of Maximum score</th><th>Phase</th></tr>
<tr><td>In-house idea generation</td><td>157</td><td>157/300 = 52,3%</td><td rowspan="3">High scores indicate that companies may be idea-poor</td></tr>
<tr><td>Cross-pollination among businesses</td><td>194</td><td>194/300 = 64,6%</td></tr>
<tr><td>External sourcing of ideas</td><td>152</td><td>152/300 = 50,6%</td></tr>
<tr><td>Selection</td><td>122</td><td>122/300 = 40,6%</td><td rowspan="2">High scores indicate that companies may be conversion-poor</td></tr>
<tr><td>Development</td><td>132</td><td>132/300 = 44%</td></tr>
<tr><td>Diffusion</td><td>229</td><td>229/450 =50,8%</td><td>High scores indicate that companies may be Diffusion-poor</td></tr>
</table>

The presented total scores above showed that the higher total score of activity was cross-pollination. It revealed that almost of the observed companies had weak collaboration with cross units in innovation. Whereas, a good collaboration with other unit was able to ease innovation process such as finding idea so idea generation phase would be better.

Commonly, key performance indicator usually used to measure the success of cross pollination was *Number of high-quality ideas generated across units*. Meantime, the lowest total score was achieved by selection activity meaning that the awareness of company to screen the new idea had been emphasized. Based on total score presented in table 3, the priority of activities which were able to be improved by footwear industries in East Java to improve innovation value chain should be discussed. Successively, the priority of activities to be improved were cross-pollination among businesses, in-house idea generation, diffusion, external sourcing of ideas, development and selection. As mentioned in literature review, some references did not discuss in detail that the phases of innovation value chain were contributed by some activites. Therefore, total scores of acitivities displayed in table 3 should be unified into related innovation phase refering to figure 1. The result of calculation was presented in table 4.

Tabel 4. Total score of innovation value chain

<table>
<tr><th colspan="2">IVC Activity</th><th>Total Score</th><th>% out of Maximum score</th><th>Phase</th></tr>
<tr><td>In-house idea generation</td><td rowspan="3">Idea Generating</td><td rowspan="3">503</td><td rowspan="3">503/900 = 55,8%</td><td rowspan="3">High scores indicate that companies may be idea-poor</td></tr>
<tr><td>Cross-pollination among businesses</td></tr>
<tr><td>External sourcing of ideas</td></tr>
<tr><td>Selection</td><td rowspan="2">Conversion</td><td rowspan="2">254</td><td rowspan="2">254/600 = 42,3%</td><td rowspan="2">High scores indicate that companies may be conversion-poor</td></tr>
<tr><td>Development</td></tr>
<tr><td>Diffusion</td><td>Diffusion</td><td>229</td><td>229/450 =50,8%</td><td>High scores indicate that companies may be Diffusion-poor</td></tr>
</table>

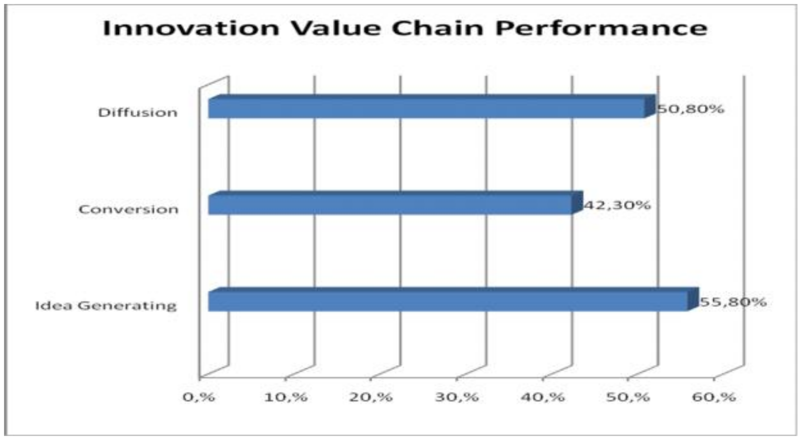

Figure 6. Innovation Value Chain Performance

The figure 6 showed that firms were relatively good at idea conversion (42,30%) but the companies had a little difficulties at diffusion (50,80%) and at idea generation (55,80%). From the result response showed (see table.2) that the weakest links (the innovation process bottleneck) was cross-pollination activity [in which the people typically did not collaborate on projects across units, businesses, or subsidiaries (88,6%)], while the strongest links was selection activity [The companies had a risk- averse attitude toward investing in novel ideas (39,3%)]. Based on observation to some industries, it was observable that there was weak collaboration between units. It was caused by tight target. Almost of employee had to work with tight schedule to fullfil the promised schedule. Based on the Focus Gruoup Discussion, almost idea of product development was sourced from the owner. This situation made the companies brave to take some risk and strong to involve in value chain innovation activites. Involvement and leverage of owner are able to support the next process.

4.3. Multivariate Analysis of Variance (MANOVA)

The general purpose of MANOVA is to determine whether multiple levels of independent variables on their own or in combination with one another have an effect on the dependent variables. In this section, MANOVA was employed to convey the influence of company characteristics to innovation value chain comprising idea generation phase, conversion phase and diffusion phase. Company characteristics thought to affect each phases were number of employees, age of company, and market orientation. In additional information, idea generation phase comprised in-house idea generation, cross-pollination among businesses, external sourcing of idea; conversion phase comprised selection and development and diffusion phase comprised spread activity. Build hypothesis is the first step to employ MANOVA. Generally, hypothesis is built as follow:

H0: The means of all groups in dependent variable are equal

Hi: At least there is a pair of mean of group in dependent variable which is significantly different

In this case, nine pairs of hypothesis would be built and be tested for each independent variables suspected to influence each phases. Decision in aforementioned test was accepted by comparing significance value and alpha value. Popularly, there are four measures widely used to calculate significance value in MANOVA. They are wilks' Lambda, Pillai's trace, Hotteling-Lawley trace and Roy's largest root . The fundamental difference among them is the way to analyze dependent variables combination causing the amount of variance in the data. Pillai's trace is considered the most reliable of the multivariate measure and offers the greatest protection against error. By using SPSS software the results of MANOVA were obtained and the example given for the test as followed:

Objective of the test
The test were conducted to convey whether number of employees worked on Idea generation comprising in-house idea generation, cross-pollination among businesses and external sourcing of idea. Base on the aforementioned statement, it was known that number of employees would be independent variable and idea generation would be dependent variable.

Hypothesis
H0: *The means of in-house idea generation, cross-pollination among businesses and external sourcing of idea are equal.*
Hi: *At least there is a pair of mean of group in idea generation which is significantly different.*

Result
The output of SPSS software for MANOVA was presented in Table 5.

Decision and interpretation
Rejecting or do not rejecting null hypothesis (H0) was accepted by comparing alpha value and significance value of Pillai's Trace presented on Multivariate Tests[c] table. In this case, obtained significance value was 0.164 which was greater than alpha value of 0.05. Therefore, the decision of test was do not reject H0 meaning that the means of in-house idea generation, cross-pollination among businesses and external sourcing of idea are equal.

Table 5. Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	0,954	69,607[a]	6,000	20,000	0,000
	Wilks' Lambda	0,046	69,607[a]	6,000	20,000	0,000
	Hotelling's Trace	20,882	69,607[a]	6,000	20,000	0,000
	Roy's Largest Root	20,882	69,607[a]	6,000	20,000	0,000
Employee	Pillai's Trace	1,034	1,336	24,000	92,000	0,164
	Wilks' Lambda	0,248	1,451	24,000	70,982	0,116
	Hotelling's Trace	2,032	1,566	24,000	74,000	0,074
	Roy's Largest Root	1,521	5,830[b]	6,000	23,000	0,001

a. Exact statistic
b. The statistic is an upper bound on F that yields a lower bound on the significance level.
c. Design: Intercept + Employee

By following the same step above, significance value of MANOVA test for each independent variable and dependent variables was presented on Table 6.

Table 6. Manova Result

Company Characteristics	Idea Generation	Conversion	Diffusion
Business Scale (Number of Employees)	0.164	0.889	0.324
Operational period (Age of Company)	0.033	0.824	0.293
Market Orientation	0.044	0.84	0.185

Based on p-value presented above, it was concluded that company characteristics influencing a certain phase of innovation value chain significantly were age of company and market orientation. Specifically, both of them influenced idea generation phase. Age of company would consider about company's learning process in business including in innovation process. It related to the experience in understanding, finding and realizing the new idea which was proper with customer expectation and market competition.

Therefore, company was able to provide expeditious resources in innovation proccess. Meantime, market orientation would consider about strategy determination which was proper with various characteristics of market such as export market or domestic market. Age of company and market orientation were input factor belonging to company charactheristics which were influencing the initial phase of innovation value chain. Conversion and diffusion were not statistacally influenced since both of them probably only kept pace with policy related to realization of new idea determined before. Therefore, idea generationwas critical point in harmonizing between innovation and company internal which were suitable with company characteristics. Meanwhile, there were no enough evidence to conclude that number of employees would influence the innovatioan value chain.

5. Conclusions

The study found that that the weakest links (the innovation process bottleneck) is cross-pollination activity [in which the people typically don't collaborate on projects across units, businesses, or subsidiaries (88,6%)], while the strongest links is selection activity [the companies have a risk- averse attitude toward investing in novel ideas (39,3%)]. Based on observations in several industries appear that collaboration and cooperation among units within the company is very weak. This is due to the worker must work to a very tight work schedule to meet the target completion time of products. Based on the results of focus group discussions, most of the product development ideas come from the owner of the company. This condition causes the company the courage to take risks in product development becomes very high and became the company's strength in innovation value chain activities. Based on p-value, the study found that company characteristics influencing a certain phase of innovation value chain significantly were company period (age of company) and market orientation. Specifically, both of them influenced idea generation phase.

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