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# Organizational culture, resources, and innovativeness of shipbuilding companies: Moderating role of external factors

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ABSTRACT

The considerable attention of Malaysian government on innovativeness, the quest to increase her market share from 1% to 2% of the global shipbuilding industry by 2020, and the strategic regional development plan of the Sarawak state in particular that focuses on the priority sectors including the Maritime industry motivated the conduct of this study. This paper, therefore, assesses the current innovativeness level among the shipbuilding companies; examines the direct relationship between independent variables (company culture and resources), the dependent variable (company innovativeness) and the moderating effect of external factors on the relationship. We used the simple random sampling to collect data from shipbuilding companies in Sarawak. We received 41 valid questionnaires out of 65 questionnaires distributed, yielding 63% response rate. We used descriptive statistics to determine the extent of innovativeness of the shipbuilding companies. PLS SEM was employed to test the direct and moderating effects on the variables. The findings of this research suggest that the extent of organizational innovativeness of the shipbuilding companies in Sarawak is in the category of "early majority" based on the mean score of 3.09 and this is slightly lower compared to the extent of innovativeness among the housing developers in Malaysia which was found to be at "adopter" category based on the mean score of 3.67 in a previous related study. While organizational culture was found to have negative relationship with innovativeness, organizational resources showed a significant positive relationship with innovativeness among the shipbuilding companies. Additionally, external factors moderate the relationships between resources and innovativeness. While the small sample size used in data collection is a major limitation of this study. It is hoped that our findings complement the existing body of knowledge and provides a direction for the future innovativeness studies.



## 1. Introduction

The considerable attention on innovativeness in Malaysia and the strategic regional development plan of the Sarawak state in particular that focuses on the priority sectors including the Maritime industry has become a major drive for Malaysia to aim at improving her position in the global market by moving from 1% in 2010 to capture 2% of the global shipbuilding industry by 2020. Achieving the target of 2% of the global Shipbuilding market share will certainly require a considerable innovativeness among the Shipbuilding companies in all aspects of their operations. Empirical studies have shown that innovativeness would enhance the competitive advantage and the performance of organizations (Ackermann et al., 2015). Learning from previous research and even replicating research hypotheses as well as the methodology will certainly provide numerous benefits in terms of comparability and give deeper value to Shipbuilding studies, greater visibility of Shipbuilding in innovation policies as well as positioning the Shipbuilding research in the mainstream innovation academia. Hence, this paper provides a platform for developing a new knowledge that encompasses the distinct features of the shipbuilding industry (Hjalager, 2010).

Despite the considerable research in the field of industrial innovation and innovativeness, the Shipbuilding industry has only received a limited attention (Hjalager, 2010; Camisón and Monfort-Mir, 2012). To mention the few, Tsekouras et al. (2011) examined the types, nature and the impacts of innovations developed among small shipping

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companies in Greece and found that organisational and process innovations are critical to the dynamic strategy among small service companies. Marsh (2012) explored the introduction of cruise ship tourism into historic urban centres, and the mitigation policies that can be implemented to encourage sustainable development of the relationship in South Carolina. The work of Dennett et al. (2014) focused on the complex nature of the activities undertaken by waiters and pursers on-board cruise ships in the United Kingdom's cruise ship port. Previous studies mostly focused on the ship operators and less attention has been directed to studies on the shipbuiding companies particularly in the field of organizational innovativeness. The need for a better empirical research and evidence about innovativeness at the industry level is well documented in the literature (Hall and Williams, 2008; Hjalager, 2010). Such endeavor will enable an adequate representation of industries during any comprehensive or national or international innovation survey. In narrowing the research gap identified in the literature, this paper therefore, seeks to achieve the following objectives:

a. Determine the innovativeness of the Shipbuilding companies operating in Sarawak.
b. Examine the influence of company culture on the innovativeness among the ship building companies operating in Sarawak.
c. Examine the influence of company resources on the innovativeness among the ship building companies operating in Sarawak.
d. Examine the moderating influence of external factors on the relationship between company resources and innovativeness among the ship building companies in Sarawak.

## 2. Hypothesis development

### 2.1. Organizational innovativeness

Various definitions of the term organizational innovativeness have been provided by the literature. In this study, organizational or company innovativeness is defined as the propensity or capacity of an organization or company to adopt innovative products, processes, concepts, and business systems and technology that are new to the shipbuilding industry; not just for business survival, but also to meet the needs of the customers or end users, taking into consideration sustainability and the environment.

While previous studies have advanced our understanding about organizational innovativeness (Damanpour and Evan, 1992; Wang and Ahmed, 2004; Kocher et al., 2011; Peters and Naicker, 2013; Kaya and Torlak, 2013), there are varying definitions of the term in the extant literature. Knowles et al. (2008) defined organizational innovativeness as "the propensity of firms to create and/or adopt new products, processes, and business systems". Accordingly, firm innovativeness is conceptualized as a product, process, and business system (Knowles et al., 2008). However, their study did not considered information technology as an important dimension of innovation, despite several studies associating the adoption of technology with innovation (Kock et al., 2011). This paper adopts Kamaruddeen et al. (2012a)'s definition as organization's drive or capacity to adopt innovation in shipbuilding products, processes or concepts, businesses and information technology that are new to the shipbuilding companies or the industry in order to attain competitive advantage and meet customers' needs.

### 2.2. Organizational internal and external factors

Emiprical research shows that certain organizational internal factors, such as culture and structures (Russell and Hoag, 2004; Kamaruddeen et al., 2012b); organizational characteristics, such as firm size (Kamaruddeen et al., 2015); organizational structure and resources (Subramanian and Nilakanta, 1996) will influence the adoption of innovation. However, while organizations are capable of managing their internal factors to enhance innovative capability, the external factors are usually beyond their control. Hence the need to also examine the influence of external factors on organizational innovativeness. Accordingly, factors influencing organizational innovativeness are broadly clasified as internal and external factors (Akgun et al., 2007).

In this paper, internal factors comprise of organizational culture and resources. We conceptualized organizational culture as adhocracy culture and market orientation; and organizational resource as transformational leadership style and organizational learning. Likewise; external factors comprise environmental uncertainty, market competition and government support.

#### 2.2.1. Organizational culture and innovativeness

Previous studies have also shown that organizational culture plays an important role in innovation capabilities, efficiency and improved productivity within organizations (Alas et al., 2009). The shipbuilding businesses are required to develop and prioritize the culture that supports innovativeness adoption as an avenue for the attainment of competitive edge. In specific terms, researchers like Cherian and Deshpande (1985) argued that organization's cultural systems do interact with their structure which creats the basis for organizational policy and procedures. These systems in turn, influence all organizational actions, which include innovation performance (Obendhain and Johnson, 2004).

Cameron and Quinn (2005) identified four different cultural dimensions: Adhocracy, clan, hierarchy, and market orientation cultures. These four dimensions of organizational culture exemplify different value orientations. Clan emphasizes

flexibility, change and it focuses on the internal organization. In adhocracy, the external focus is emphasized, in addition to flexibility, continuous growth, adaptation, creativity, and resource acquisition. Hierarchy organizations are also externally focused, but they are control-oriented with emphasis on productivity and accomplishment of fixed objectives to gain more competitive advantage with the external environment. Market orientation culture places emphasis on stability, and focuses on the internal organization. It prioritizes uniformity, co-ordination, internal productivity and a strict adherence to regulations (Shih and Huang, 2010). Even though the competing value framework (CVF) subdivided these cultural dimensions into quadrants with divergent features, it should be noted that organizations hardly align with only one value system.

In this paper, the competing value framework of Cameron and Quinn (2005) was adopted to measure organizational culture to examine the market and adhocracy cultures practiced by shipbuilding companies. Implying that only the adhocracy and market orientation culture dimensions are considered in this to determine the shipbuilding company culture (Duygulu and Özeren, 2009).

Also, previous studies have demonstrated that market-oriented organizations create corporate cultures, which is the basis for attaining a competitive edge, and it is also an essential determinant of organizational performance (Narver and Slater, 1990). The development of market orientation within an organization is to represent the organization's focus on all its stakeholders, customers, suppliers, competitors and governmental institutions (Slater and Narver, 1995). In this sense, organizations with market orientation are always proactive in developing innovative capabilities to rise above their competitors. Therefore, it can be inferred that market oriented companies are strongly linked with innovativeness. Also, this proposition is consistent with the extant literature (Szymanski and Henard, 2001; Naidoo, 2010) where it was suggested that the adoption of market culture leads to innovativeness. We therefore hypothesize H1 as follows:

**Hypothesis 1:** Organizational culture will have a positive influence on the innovativeness of Shipbuilding companies.

### 2.2.2. Organizational resources and innovativeness

Previous studies have examined the extent to which company resources can be employed to entrench innovative capabilities. While the resource based view (RBV) theory has been widely used in this context, organizational learning (Hurley and Hult, 1998), and transformational leadership (Ergeneli et al., 2007) have also been theorized as antecedents to innovativeness. In organizational learning, firm's ability to learn both new and external information, understand value, assimilate it and subsequently applying it to all business systems is crucial, all these have been demonstrated to assist in innovative capabilities (Cohen and Levinthal, 1990).

Organizations that prioritize members' transformation of information into knowledge and then into action can afford experimentation and adopt innovativeness more rigorously (Jiménez-Jiménez and Sanz-Valle, 2011). This knowledge acquisition depends on the organization's knowledge base (Salavou and Lioukas, 2003), as well as on their capacity to acquire external information (Chang and Cho, 2008). Equally, innovation also requires the transformation and utilization of existing organizational knowledge, which implies that firm employees need to continuously share information and knowledge. As noted by Nonaka (2002), innovative capacity is easily earned when members share knowledge within the organization and when this shared information and knowledge engender new insights. In a nutshell, organizational learning produces organizational development, acquisition, and exploitation of novel knowledge that improve organizational innovativeness (Jiménez-Jiménez and Sanz-Valle, 2011). In addition, transformational leadership allows leadership to demonstrate the ability to motivate members to outperform their initial expectations as the organization strives to attain better performance. Jung et al. (2003), demonstrated a significant relationship exists between transformational leadership and organizational innovativeness, in the sense that transformational leaders promote group effectiveness through followership empowerment so that job execution is done without leaders' interference. We therefore hypothesize H2 as follows:

**Hypothesis 2:** Organizational resources will have positive influence on the innovativeness of Ship building companies.

### 2.2.3. External factors as moderator

Baron and Kenny (1986), suggest that a moderator performs the function of a third variable which can be in form of a qualitative or qualitative variable influencing either the direction and/or the strength of the relationship existing between an independent variable and a dependent variable. In other words, the moderating variable is one that has a strong contingent effect on the independent variable-dependent variable relationship. That is, the presence of this third variable (the moderating variable) modifies the original relationship between the independent and the dependent variables" (Sekaran and Bougie, 2016).

The nature of the influence of company culture and resources on firm innovativeness is likely to vary according to the level of certain external factors (Sutcliffe and Zaheer, 1998). This section discusses the role of external factors as a moderator within the

company culture and resources resulting in innovativeness. External factors (conceptualized as environmental uncertainty, market competition and government support) in this study refer to those factors that are beyond the control of an organization. Environmental uncertainty is a well-established factor which exerts a significant influence on organizational success (Sutcliffe and Zaheer, 1998). Irregularity in the external environment always results in high level information-processing demands for organizations (Tushman and Nadler, 1978).

Studies on market competition and organizational innovativeness have a long history. For example, Dasgupta and Stiglitz (1980) showed that organizations in a competitive environment are likely to invest more in R&D than their counterparts. Recently, a number of studies have also examined the influence of a competitive market on firms' innovative activities. By estimating a production function that includes market structure, Slivko and Theilen (2014) showed that, when competition is intense, efficient firms' incentives to innovate tend to improve. In a similar manner, Salavou et al. (2004) argued that market concentration has a diminishing effect on firms' innovative behaviour because the intensity of competition induces firms to be innovative. In this study, external factors are regarded as those factors that company have no control over. They only tend to adapt to those factors through several mechanisms. As shown in the research model depicted in Fig. 1, we hypothesize H3 as follows:

**Hypothesis 3:** External factors will moderate the influence of company resources on the innovativeness of Shipbuilding companies.

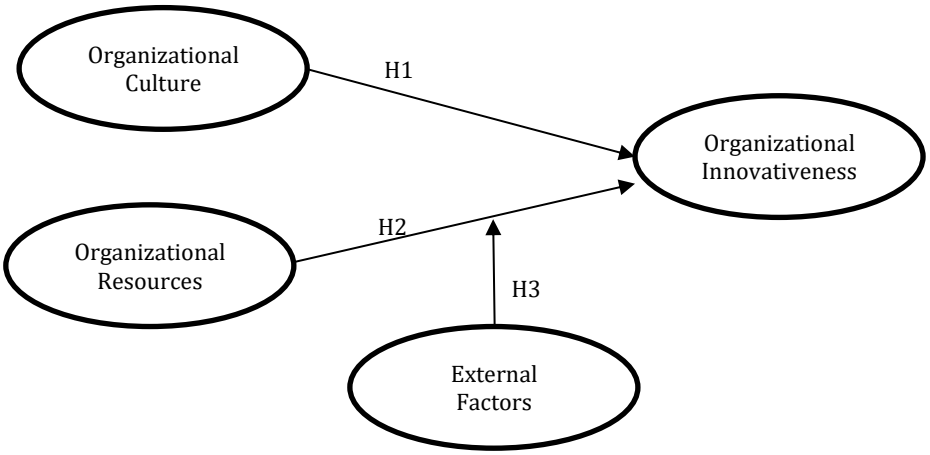


**Fig. 1:** Research model

## 3. Research method

### 3.1. Measures and scale development

A 5-point Likert-type ranging from 1 = "not at all" to 5 = "Completely true" measures used in the study are presented in Table 1. All the measures were obtained from previous studies, with sound validity and reliability. All the indicator variables are modelled reflectively because they are caused by their main constructs, and any of the indicators can be left out without changing the real meaning of the latent constructs (Diamantopoulos and Riefler, 2011). S/N Variables

**Table 1:** Source of Measurement Instrument

| | Sources | Scale | Remark |
|---|---|---|---|
| 1. Adhocracy culture | Cameron and Quinn (1999) | 5-point | Adopted |
| 2. Market orientation | Jaworski and Kholi (1993) | 5-point | Adopted |
| 3. Transformational leader | Garcia-Morales et al. (2006) | 5-point | Adopted |
| 4. Organizational learning | Garcia-Morales et al. (2006) | 5-point | Adopted |
| 5. Government support | Lin (2007) | 5-point | Adopted |
| 6. Environmental uncertainty | Lin (2007) | 5-point | Adopted |
| 7. Market competition | Premkumar and Robert (1999) | 5-point | Adopted |
| 8.Firm Innovativeness | Knowles et al. (2008); ) | 5-point | Adopted |

### 3.2. Data collection and sample

The data for this study was collected from the Shipbuilding companies operating in Sarawak, Malaysia. Sarawak state was chosen because the majority of the shipbuilding companies are located there (Zhang et al., 2011). The respondents for the survey were executive directors, operating and business managers in each of the companies, who have acquired satisfactory professional experiences to provide the data needed for this study. The population of this study consists of companies that are fully registered with the Association of Shipbuilders in Sarawak. Krejcie and Morgan (1970)'s criteria was used to determine the appropriate sample size for this research and to ascertain the significance of 95% confidence level. It was found that 65 samples were deemed

appropriate for the population of 97 ship building companies. Following Sekaran and Bougie (2013), the simple random sampling was used to select the respondents for this study. The copies of questionnaires were sent by post to the selected companies, accompanied by a cover letter which explained its purpose and also which assured that the responses will be treated with utmost confidentiality throughout the research. Next, all the 41 returned questionnaire were retained for analysis because they were completely filled.

The 41 returned questionnaire corresponds to 63% response rate and this is considered adequate (Akintoye, 2000; Dulaimi et al., 2003). Owing to the fact that this study uses a self-reporting survey, Podsakoff and Organ (1986) Harman's single factor test was carried out to further examine the common method variance. In conducting Harman's single-factor test, all variables of interest were entered into the exploratory factor analysis (EFA) with the aid of un-rotated principal components factor analysis. The results suggest that the common method variance is not of great concern in this study, and it is unlikely to inflate the relationships among the variables measured in this study. The characteristics of the sample, as shown in Table 2, consist of the positions, the number of employees, company age and the number of full time employees.

**Table 2:** Demographic profile of respondent

| Respondents | Frequency | % |
|---|---|---|
| Position in the Company | | |
| Executive/Managing Director | 9 | 21.9 |
| Marketing manager | 7 | 17.1 |
| General Manager | 6 | 14.6 |
| Operations Manager | 8 | 19.5 |
| Others | 11 | 26.8 |
| Work Experience (in years) | | |
| Years | | |
| 1-5 Years | 6 | 14.6 |
| 6-10 years | 16 | 39.0 |
| More than 10 years | 19 | 46.3 |
| Gender | | |
| Male | 40 | 97.5 |
| Female | 1 | 2.4 |
| Company Ownership | | |
| Proprietorship | 0 | 0 |
| Partnership | 0 | 0 |
| Private Limited (Sdn Bhd) | 39 | 95.1 |
| Corporation | 2 | 4.8 |
| Others | 0 | 0 |
| Company Location | | |
| Within Sarawak state | 34 | 82.9 |
| Within few states | 4 | 9.8 |
| Regional | 0 | 0 |
| Across Malaysia | 1 | 2.4 |
| International market | 2 | 4.8 |
| Company age | | |
| 1-5 Years | 11 | 26.8 |
| 6-10 years | 19 | 46.3 |
| More than 10 years | 11 | 26.8 |
| Number of Full Time Employees | | |
| <50 | 39 | 95.1 |
| 51-100 | 1 | 2.4 |
| >100 | 1 | 2.4 |

### 3.3. Data analysis

To achieve the first objective of this paper, we obtained the mean score of the organizational innovativeness of the shipbuilding companies surveyed. Next, Rogers (2003)'s innovation adoption categories were used to interpret the mean score and to determine the extent of innovativeness among the shipbuilding companies operating in Sarawak, Malaysia. To achieve the second, third and fourth objectives of this paper, we used the Partial least squares (PLS) of the Structural Equation Modelling technique to analyse the data obtained (Goodhue et al., 2007). This analysis technique was chosen based on the following considerations. First of all, PLS-SEM has the ability to model latent constructs either formatively or reflectively. All the latent constructs in this study were modelled reflectively. Secondly, PLS path modelling can be used for the assessment of the psychometric properties of individual latent constructs. Thirdly, the technique has the ability to model latent variables under non-normality conditions. Fourthly, it has the ability to handle the small sample size

(Chin, 1998). Hence, PLS SEM was considered appropriate for analysing the 41 valid responses. The analyses were then conducted using a two-step procedure (Henseler et al., 2009), comprising (1) the measurement model assessment, where item reliability and validity are assessed, and (2) the structural model assessment, where the significance of path coefficients is tested, and the coefficient of determination ($R^2$ value) is determined.

## 4. Results

### 4.1. Extent of innovativeness of shipbuilding companies

The result of descriptive statistics showed that the overall mean for innovativeness is 3.09. The Alston and Miller (2001)'s Likert scale interpretation on the 5-point Likert scale in the questionnaire relative to Rogers' (2003)'s innovativeness categories: laggard, late majority, early majority, adopters, and innovators (in ascending order with innovator being the highest) used in this paper are as follows: not at all (1.0-1.49) = laggard, slightly true (1.5-2.49) = late majority, moderately true (2.5-3.49) = early majority, mostly true= (3.5-4.49) = adopters, and completely true (4.5-5.00) = innovators. Finally, we determined the extent of innovativeness by examining which of the range above corresponded to the mean score of organizational innovativeness. The organizational innovativeness mean score (3.09) was observed to be within the "early majority" category. In other words, this finding suggests that the extent of innovativeness among the shipbuilding companies in Sarawak is in the category of "early majority". Table 3 presents the overall mean and standard deviation scores for this study's exogenous and endogenous variables. Also, Table 3 presents the number of items for each variable, their mean scores and standard deviations.

**Table 3:** Descriptive statistics for latent variables

| Latent Variables | Number of Items | Mean | Std. Deviation |
|---|---|---|---|
| Environmental Uncertainty | 6 | 3.581 | 0.550 |
| Market Competition | 6 | 3.329 | 0.730 |
| Government Support | 5 | 3.512 | 0.663 |
| Adhocracy | 11 | 3.022 | 0.650 |
| Market Orientation | 10 | 3.239 | 0.728 |
| Transformational Leadership | 6 | 3.426 | 0.738 |
| Organizational Learning | 6 | 3.626 | 0.803 |
| Product Innovativeness | 3 | 2.910 | 0.813 |
| Process Innovativeness | 4 | 3.116 | 0.868 |
| Business innovativeness | 4 | 3.030 | 0.789 |
| Info-tech Innovativeness | 6 | 3.293 | 0.794 |

### 4.2. Validity and reliability

We evaluated the individual item reliability by examining the outer loadings of the latent variables (Duarte and Raposo, 2010; Hair et al., 2016). This procedure requires items with standardized loadings between 0.40 and 0.70 to be retained (Hair et al., 2016). Out of the 67 items, only one item of Adhocracy (AC1) was deleted because it loaded below the expected threshold of 0.40, while the remaining 66 items loaded well above 0.40. Thus, as indicated in the result, the items had loadings between 0.635 and 0.918. The internal consistency of reliability is explained in terms of the extent to which all parts of a particular scale measure a concept (Sun et al., 2007). Cronbach's alpha coefficient and composite reliability coefficient are mostly used to estimate this reliability of a scale (McCrae et al., 2011). Therefore, to ascertain the internal consistency of this study's measures, composite reliability coefficient is considered against the popular Cronbach's alpha coefficient. Organizational researchers (Gotz et al., 2010) claim that composite reliability coefficient has lesser biased estimation of reliability than the Cronbach's alpha coefficient. Their claim is based on the fact that in Cronbach's alpha coefficient, items simultaneously contribute to the latent variable without ascertaining the individual items' contribution. Therefore, the criteria for interpreting internal consistency of reliability using the composite reliability coefficient stated that the reliability coefficient should be 0.70 and above (Bagozzi and Yi, 1988; Hair et al., 2011). Table 4 presents the composite reliability coefficients in this study's latent variables.

### 4.3. Measurement model results

We adopted the two-step approach for the evaluation of the PLS-SEM path model results in this study. This procedure comprises of the following steps. First is the measurement model assessment, where item reliability and validity are assessed. Second are the structural model assessment, where the significance of path coefficients is tested, and the coefficient of determination (Henseler et al., 2009). In the estimating measurement model, the individual item reliability, internal consistency of reliability, content validity, discriminant validity and convergent validity are determined (Hair et al., 2011;2016).

**Table 4:** Loadings, composite reliability (CR) and AVE

| Construct and their variables | Loading |
|---|---|
| Product innovativeness, AVE = 0.778; Composite reliability = 0.913 | |
| PR1. We tend to be an early adopter of innovative ship building materials | 0.775 |
| PR2. We are able to adopt innovative ship building used by other companies. | 0.780 |
| PR3. We seek for innovative building materials from outside this organization | 0.737 |
| Process innovativeness, AVE = 0.725; Composite reliability = 0.913 | |
| PC1. We tend to be an early adopter of the innovative ship building process | 0.746 |
| PC2. We are able to implement the innovative process used by other companies | 0.833 |
| PC3. We actively develop the in-house solution to improve our ship building services. | 0.772 |
| PC4. We seek for innovative ship building process outside this organization | 0.731 |
| Business system innovativeness, AVE = 0.750; Composite reliability = 0.923 | |
| BS1. We see creating new business systems as critical to our success | 0.773 |
| BS2. We tend to be an early adopter of innovative business system | 0.918 |
| BS3. We are able to implement innovative business systems used by other companies | 0.862 |
| BS4. We actively seek innovative business systems from outside this company | 0.904 |
| Information technology innovativeness, AVE = 0.635; Composite reliability = 0.913 | |
| Info1. Most of our employees are computer literate | 0.810 |
| Info2. We have a policy that encourages the application of information technology | 0.786 |
| Info3. Our company is well computerized | 0.703 |
| Info4. Our company has high bandwidth connectivity to the Internet | 0.782 |
| Info5. Employees support the application of information technology | 0.805 |
| Info6. We conduct most business transactions online | 0.748 |
| Adhocracy culture, AVE = 0.602; Composite reliability = 0.938 | |
| AC2. The company is an entrepreneurial place | 0.800 |
| AC3. The leadership in our company generally exemplifies innovativeness | 0.813 |
| AC4. The leadership in our company generally exemplifies risk-taking | 0.822 |
| AC5. The management style in the company is characterized by freedom | 0.797 |
| AC6. The management style in our company is characterized by uniqueness | 0.782 |
| AC7. We are committed to innovation | 0.791 |
| AC8. We are committed to development | 0.717 |
| AC9. The company emphasizes the act of creating new challenges | 0.733 |
| AC10. The company emphasizes the acquisition of new resources | 0.792 |
| AC11. We define success on the basis of unique services | 0.701 |
| Market orientation, AVE = 0.649; Composite reliability = 0.949 | |
| MO1. Our staff share competitor information within the company | 0.788 |
| MO2. We respond rapidly to competitive actions | 0.827 |
| MO3. The company's top management regularly discusses competitors' strength | 0.836 |
| MO4. We target at customers when we have an opportunity for competitive advantage | 0.799 |
| MO5. The company pays close attention to after- service | 0.796 |
| MO6. Our business objectives are driven by customer satisfaction | 0.823 |
| Transformational Leadership, AVE = 0.665; Composite reliability = 0.922 | |
| TSL1. The management team is always on the lookout for new opportunities for the organization | 0.714 |
| TSL2. The management team has a clear view of its final goals | 0.685 |
| TSL3. The management team succeeds in motivating the rest of the company's employees | 0.794 |
| TSL4. The management team always acts as the organizational leading force | 0.712 |
| TSL5. The company leaders are capable of motivating the employees on their job | 0.787 |
| TSL6. The company has leaders who are capable of guiding the employees on their job | 0.783 |
| Organizational learning, AVE = 0.647; Composite reliability = 0.916 | |
| OL1. The company promotes a learning culture | 0.728 |
| OL2. The company has a strong commitment to learn | 0.718 |
| OL3. The company promotes open-mindedness | 0.751 |
| OL4. The management team acts a learning agent for the company | 0.728 |
| OL5. The company proactively questions long-held way routines | 0.725 |
| OL6. Our shared vision provides a focus for learning | 0.677 |
| Environmental uncertainty, AVE = 0.602; Composite reliability = 0.929 | |
| EU1. Our customers' preference changes slightly over time | 0.788 |
| EU2. Our customers tend to look for new services all the time | 0.847 |
| EU3. Other companies are adopting innovation in their services | 0.850 |
| EU4. New customers are demanding for our services | 0.828 |
| EU5. New customers tend to have needs that are different from our existing customers | 0.812 |
| EU6. We currently cater for many of the same customers we used to deal with in the past | 0.843 |
| Market competition, AVE = 0.693; Composite reliability = 0.919 | |
| MC1. Competition is intense the ship building industry | 0.797 |
| MC2. There are many promotions in the ship building industry | 0.856 |
| MC3. Anything that one competitor can offer. others can provide the same | 0.863 |
| MC4. Price competition is a hallmark of this industry | 0.834 |
| MC5. We hear of a new competitive move almost every time | 0.812 |
| Government support, AVE = 0.659; Composite reliability = 0.905 | |
| GS1. Government provides financial support for Innovation | 0.635 |
| GS2. Government encourages innovation in the Ship building industry | 0.848 |
| GS3. Government agencies provide incentives for innovation | 0.829 |
| GS4. Government introduces the regulation that promotes innovation | 0.878 |
| GS5. Government policy promotes competition in the ship building industry | 0.846 |

Additionally, the coefficients ranged from 0.905 to 0.938, implying that the latent variable's internal consistencies were adequate as they all exceeded the minimum level of 0.70. Table 5 presents the square root of AVE (appearing in bold) is compared to the off-diagonal coefficients, where it was clear that the

square roots of all the AVEs along the diagonals are greater than the off-diagonal coefficients both in rows and columns, indicating adequate discriminant validity. Discriminant validity is also assessed by comparing the item loadings with the cross-loadings, where all the item loadings should be greater than other loadings in rows and columns. As shown in Table 6, all item loadings were not only higher than the recommended value of 0.5, but they also higher than the cross loadings. This suggests that discriminant validity of the outer model is satisfactory (Hair et al., 2009).

**Table 5:** Correlations among variables (n=41)

| | Latent Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Adhocracy | **0.776** | | | | | | | | | | |
| 2 | Buss. innovativeness | 0.608 | **0.866** | | | | | | | | | |
| 3 | Envt. Uncertainty | 0.521 | 0.359 | **0.828** | | | | | | | | |
| 4 | Govt. Support | 0.509 | 0.428 | 0.726 | **0.812** | | | | | | | |
| 5 | IT Innovativeness | 0.650 | 0.611 | 0.468 | 0.467 | **0.797** | | | | | | |
| 6 | Market Competition | 0.519 | 0.354 | 0.791 | 0.715 | 0.463 | **0.833** | | | | | |
| 7 | Market Orientation | 0.653 | 0.597 | 0.564 | 0.505 | 0.548 | 0.563 | **0.805** | | | | |
| 8 | Org. Learning | 0.580 | 0.578 | 0.492 | 0.485 | 0.645 | 0.494 | 0.525 | **0.804** | | | |
| 9 | Process Innovativeness | 0.659 | 0.711 | 0.397 | 0.525 | 0.690 | 0.395 | 0.595 | 0.629 | **0.851** | | |
| 10 | Product Innovativeness | 0.613 | 0.679 | 0.368 | 0.437 | 0.640 | 0.371 | 0.570 | 0.576 | 0.790 | **0.882** | |
| 11 | Transform. Leadership | 0.685 | 0.469 | 0.399 | 0.459 | 0.512 | 0.393 | 0.650 | 0.651 | 0.605 | 0.742 | **0.815** |

### 4.4. Structural model and hypothesis testing

The higher-order model (hierarchical component model, HCM) involves the testing of second-order structures that have two level-components. This model is considered to achieve a more parsimonious theoretical relationship and to reduce the complexity of a model (Hair et al., 2013). This procedure also gives additional evidence in support of this study's theoretical model as indicated in the structural model, as evidenced in Chin (2010). All the four variables in this study are multi-dimensional, which necessitated the inclusion of higher-order model, and in estimating the model, the latent variable scores of these dimensions were taken as indicators from the Smart PLS analysis report.

As indicated by Byrne (2010), to further advance the knowledge on the existing theoretical basis, the second order constructs should be conceptually explained by their first order constructs (i.e., the dimensions of company culture, company resources, external factors, and firm innovativeness). Before estimating the research model, it is important to establish the suitability of the first order constructs to be able to conceptually describe the second order constructs. This is presented in Table 7 where the results show the suitability of the dimensions of the first order constructs to explain the second order constructs in this study.

**Table 6:** Second-order construct establishment

| Second-order Constructs | First-order Constructs | Loadings | SE | T-Value | P-Value | $R^2$ |
|---|---|---|---|---|---|---|
| Company Culture | Adhocracy Culture | 0.989 | 0.006 | 88.474 | 0.00 | 0.977 |
| | Market Orientation | 0.987 | 0.006 | 88.732 | 0.00 | 0.977 |
| Company Resources | Transform. Leadership | 0.924 | 0.017 | 34.852 | 0.00 | 0.839 |
| | Organizational Learning | 0.892 | 0.013 | 41.445 | 0.00 | 0.811 |
| External Factors | Environ. Uncertainty | 0.962 | 0.015 | 52.579 | 0.00 | 0.963 |
| | Market Competition | 0.958 | 0.006 | 0.181 | 0.43 | 0.944 |
| | Government Support | 0.884 | 0.009 | 30.763 | 0.00 | 0.714 |
| Firm Innovativeness | Product Innovativeness | 0.879 | 0.007 | 31.702 | 0.00 | 0.749 |
| | Process Innovativeness | 0.909 | 0.010 | 27.602 | 0.00 | 0.821 |
| | Business Innovativeness | 0.865 | 0.008 | 36.201 | 0.00 | 0.730 |
| | Info-Tec Innovativeness | 0.844 | 0.012 | 30.435 | 0.00 | 0.751 |

*P <0.01*

In Table 6, the two first orders constructs, which are: adhocracy and market orientation are well explained by company culture as their R2 values are 0.977 respectively? Equally, organizational culture was able to explain the two first order constructs (transformational leadership and organizational learning) considering their $R^2$ values which are 0.839 and 0.811, respectively. The $R^2$ value recorded for the three first order constructs of external factors indicated that they have been well explained by their second order construct with environmental uncertainty having 0.963, market competition with 0.944, and government support with 0.714. Thus, the results in Table 6 confirm the distinct nature of this study's constructs.

After establishing the fitness of the outer model in the previous steps, the next assessment involves inspecting the structural model to determine the path coefficients for the hypotheses testing with the aid of Smart PLS 2.0 software. This study applied the non-parametric evaluation criteria based on the bootstrapping procedure with 500 bootstrap samples and 41 cases in order to assess the significance of the path coefficients (Hair et al., 2016; Hair et al., 2011). Fig. 2 depicts this study's structural (inner) model, without the inclusion of the moderating effects.

The non-parametric evaluation criteria based on the bootstrapping procedure with 500 bootstrap samples and 41 cases were applied to assess the significance of the path coefficients (Hair et al., 2016;

Henseler et al., 2009). As demonstrated in Figs. 3 and 4, the inner model, including the moderating effects, is depicted. Table 7 also explains the result for the full structural model including the moderating variables, which are company resources and external factors.

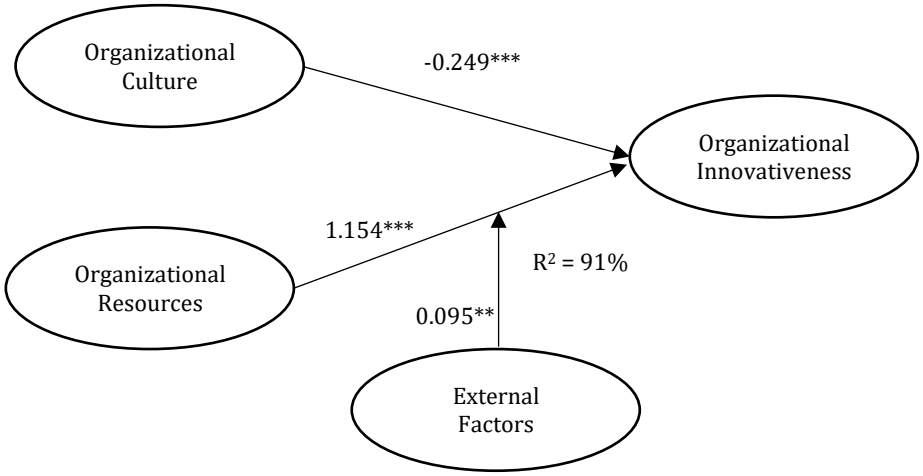


**Fig. 2:** Path coefficient beta values, significance and $R^2$ value

**Table 7:** Result of hypothesis testing

| Hypothesis | Path | Beta | SE | t-value | P value | Decision |
|---|---|---|---|---|---|---|
| H1 | Culture -> Innovativeness | -0.249 | 0.045 | 5.498*** | 0.00 | Rejected |
| H2 | Resource -> Innovativeness | 1.154 | 0.039 | 29.501*** | 0.00 | Supported |
| H3 | Resource * Ext -> Innovativeness | 0.045 | 0.057 | 2.201** | 0.03 | Supported |

Note: ***Significant at 0.01; **Significant at 0.05 (2 tailed)

Table 7 shows the assessment of the full model, with the moderating effect. The results indicate a significant and unexpected negative relationship between organizational culture and the innovativeness of the ship building companies. Hence, H1 that suggested a positive significant relationship between organizational culture (adhocracy and market orientation) and innovativeness of the ship building companies in Sarawak, was not supported (β = -0.249, t = 5.498, p< 0.01). Based on hypothesis H2, the result indicates a significant relationship between company resources and innovativeness of ship building companies operating in Sarawak (β = 1.154, t = 29.501, p< 0.01). Hence, H2 was supported. Logically, shipbuilding firms' innovativeness improves with the combination of resources like transformation leadership and organizational learning.

Hypothesis H3 which highlights a moderating influence of external factors on the relationship between company resources and firm innovativeness of shipbuilding companies operating in Sarawak was supported (β = 0.045, t = 2.201, p<0.05).

### 4.5. Variance explained in the endogenous latent variables

Another important criterion for the assessment of the inner model is the coefficient of determination ($R^2$). According to Hair et al. (2011), the $R^2$ coefficient measures the proportion of an endogenous latent construct's variance that is explained by one or more predictor(s). It is a measure of a model's predictive accuracy, which is usually calculated as the squared correlation that exists between a specific endogenous variable's predicted values (Elliott and Woodward, 2007; Hair et al., 2009). The rule of thumb for an acceptable $R^2$ level, according to Falk and Miller (1992) is 0.10. Also, Chin (1998) suggested $R^2$ values of 0.67, 0.33, and 0.19 as substantial, moderate, and weak, respectively. As shown in Table 8, this study's model explains 91% of the total variance in the organizational innovativeness.

**Table 8:** Variance explained in the endogenous latent construct

| Latent Construct | Variance Explained ($R^2$) |
|---|---|
| Firm Innovativeness | 91% |

This, according to Falk and Miller (1992) implies that the three independent latent variables (company culture, company resources and external factors), including the contributions of their dimensions, jointly explain 91% of the variance in the dependent variable, which is firm innovativeness.

### 4.6. Effect size ($f^2$) evaluation

In determining the strength of a model, the $R^2$ value of the endogenous latent variable is calculated, because this procedure is suitable for the estimation of how substantial is the impact of exogenous latent construct (s) on the endogenous construct. The effect size involves running a PLS algorithm while an exogenous construct is removed from the model in order to generate the $R^2$ excluded value for the same excluded construct.

The same procedure is repeated the second time by returning the exogenous latent construct in the

model to generate the $R^2$ included value (Hair et al., 2013). All the changes observed in $R^2$ values are used to compute the effect size ($f^2$) which is calculated, thus:

$$\text{Effect size, } f^2 = \frac{R^2 \text{ included} - R^2 \text{ excluded}}{1 - R^2 \text{ included}}. \quad (1)$$

The $f^2$ values of 0.02, 0.15 and 0.35 are considered as weak, moderate, strong effect sizes respectively (Cohen, 1988). Table 9 presents the respective effect sizes of the latent variables in the structural model.

**Table 9:** Effect Size of exogenous latent constructs on endogenous construct (innovativeness)

| R-squared | $R^2$Incl. | $R^2$ Excl. | $R^2$incl-$R^2$excl | 1- $R^2$incl | Total Effect |
|---|---|---|---|---|---|
| Company culture | 0.915 | 0.903 | 0.012 | 0.988 | 0.141 |
| Company resources | 0.915 | 0.670 | 0.245 | 0.309 | 2.882 |
| External factors | 0.915 | 0.913 | 0.002 | 0.085 | 0.024 |

As indicated in Table 9, the effect sizes for company culture, company resources, and external factors on firm innovativeness are 0.141, 2.882 and 0.024 respectively. Thus, following the guideline of Cohen (1988), the effect sizes of these three independent variables on firm innovativeness is considered to be small, large, and small respectively.

### 4.7. Testing moderating effects of external factors

External factors comprising of environmental uncertainty, market competition, and government support are examined in this study to moderate the relationship between organizational resources and innovativeness. As described earlier, product indicator approach was applied to estimate the strength of this moderating effect. In Figs. 3 and 4 and Table 7, the estimates were established after applying the product indicator approach. It was earlier proposed in Hypothesis 3 that external factors will moderate the relationship between resources and firm innovativeness, in a way that this relationship will become stronger for the ship building companies operating within those external factors than for those without such factors. As indicated in both Figs. 3 and 4 and Table 7, the interaction terms representing resources and external factors ($\beta = 0.095$, $t = 2.201$, $p < 0.00$) were statistically significant.

Expectedly, hypothesis 3 was fully supported at 0.10 level of significance. Equally, the path coefficient in the structural model was utilized to plot the moderating effect of external factors on the relationship between company resource and innovativeness, and Figs. 3 and 4 clearly indicated that the relationship between shipbuilding resources and firm innovativeness becomes stronger for ship building companies facing external environmental factors such as environmental uncertainty, market competition and government support.

## 5. Discussion

The purpose of this study is to determine the extent of innovativeness; examine the influence of organizational culture and resources on the Innovativeness of Shipbuilding companies operating in Sarawak, Malaysia; and to test whether or not the external factors (environmental certainty, market competition and government support) moderate the relationship between organizational resources and innovativeness.

The extent of organizational innovativeness of the shipbuilding companies operating in Sarawak that was found to be in the category of "early majority" with mean score of 3.09 is slightly lower compared to the housing developers operating in Malaysia who Kamaruddeen et al. (2011) found to be in the "adopter" category, with the mean score of 3. 67. The" Adopters" have been described as the role model in terms of the adoption and also play an important role in decreasing doubt among other members of the population when they adopt new ideas or concepts. Notwithstanding, the innovativeness of shipbuilding companies operating in Sarawak is higher than the service companies operating in Malaysian which Jantan et al. (2003) found to be in the category of "late majority" based on the mean score of 2.74.

The finding with respect to H1 suggests a negative relationship between organizational culture and innovativeness. Hence, H1 was not supported. While this is an unexpected result because it is not consistent with most previous studies on organizational culture and innovativeness (Cameron and Quinn, 2005; Szymanski and Henard, 2001; Jantan et al., 2003; Hult et al., 2004; Dobni, 2008; Kamaruddeen et al., 2012b) there are few explanations to this surprising result. Firstly, the small sample size might have influenced the negative relationship between the variable. Secondly, the way the respondent perceived adhocracy culture and market orientation might be different due to operational and market differences between ship building and other industries.

Hypothesis 2, which stated that organizational resources would have a significant positive relationship with innovativeness, was supported. The finding suggests a significant positive relationship between resources and innovativeness. This implies that the more transformational leadership style and organizational learning among the shipbuilding companies, the greater their innovativeness would be. Our finding is consistent with Gonzalez and Skerlavaj (2009) who examined the impact of organizational learning on the innovativeness of Spanish companies. The present study is also consistent with Garcia-Morales et al. (2006) who performed correlation and regression

analyses to examine the relationship between transformational leadership and innovativeness among companies operating in Spain.

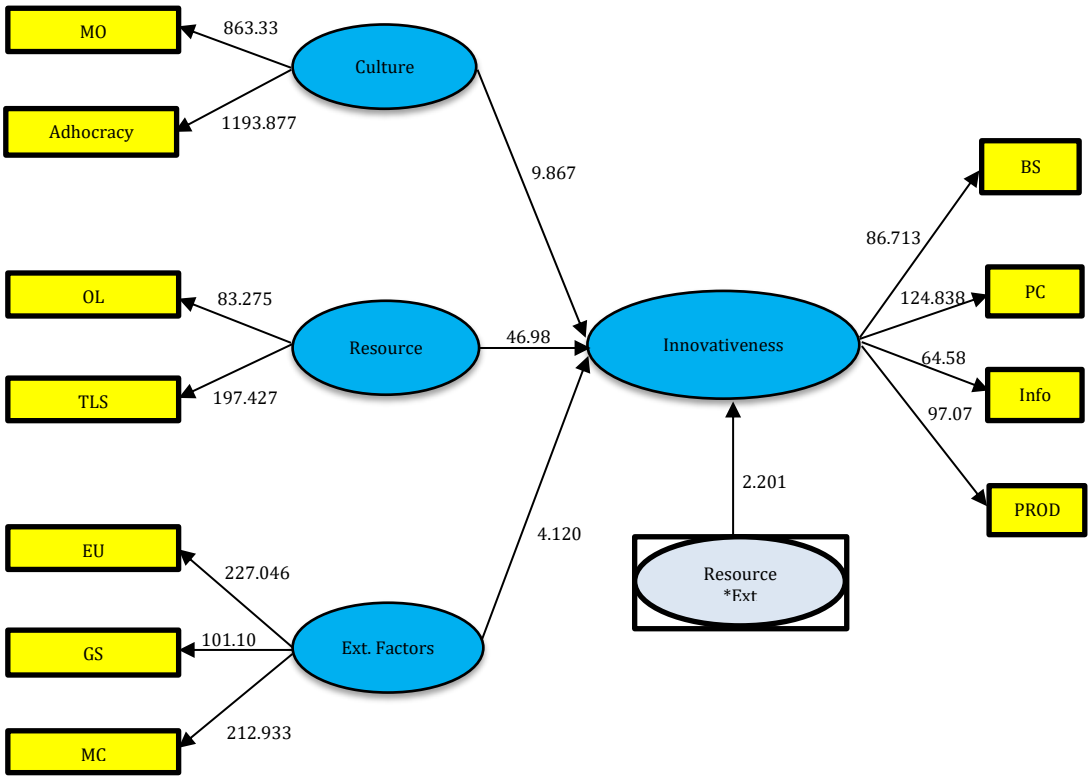


**Fig. 3:** Structural model with external factors as moderator

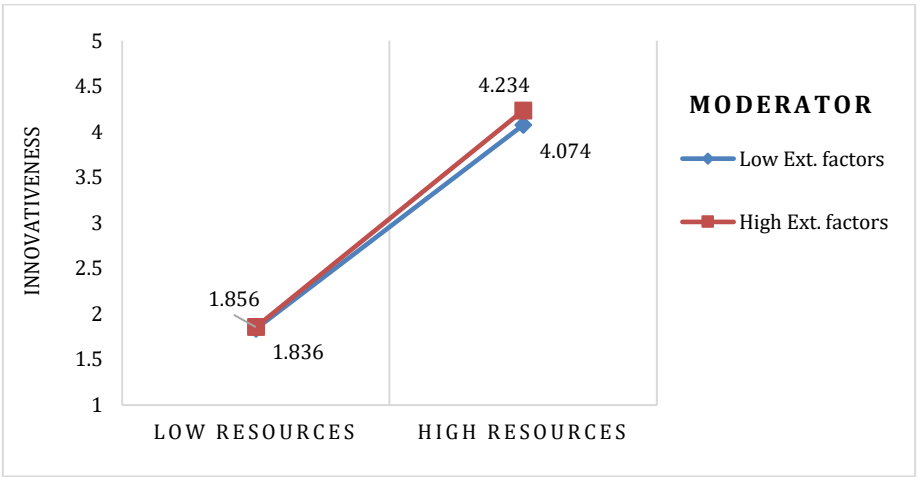


**Fig. 4:** Interaction effects of external factors and resource on firm innovativeness

In Hypothesis 3, it was hypothesized that external factors moderate the relationship between organizational resources and innovativeness, where the relationship becomes positive and stronger. This implies that the existence of external factors (environmental uncertainty, market competition and government support) will enhance the innovativeness of the shipbuilding companies which have transformational leaders and continuous organizational learning. In response to business uncertainty and high competition, transformational leaders will take advantage of government support and leverage the organizational resources to enhance their innovativeness. This finding extends the work of Prasad and Junni (2017), who found that environmental uncertainty enhanced the relationship between an organizational behaviour (top management team cognitive conflict) and firm innovativeness.

## 6. Conclusion

This study contributes to the organizational innovativeness literature and provides some theoretical and practical implications. Drawing upon the innovation adoption theory, this study sheds more light on the relationship between organizational culture, resources and innovativeness. In addition, this paper contributes to the innovativeness literature by examining the moderating effect of external factors on the relationship between organizational resources and

innovativeness. Significantly, this paper demonstrates that organizational culture (adhocracy culture and market orientation) and organizational resources (transformational leadership and organizational learning) have a positive and significant influence on organizational innovativeness. Additionally, External factors (environmental uncertainty, market competition and government support) enhance the relationship between organizational resources and innovativeness.

The findings of this study have shown that while shipbuilding companies can enhance their competitive advantage through organizational innovativeness, certain antecedents such as transformational leadership style and organizational knowledge should be given considerable attention. In addition, shipbuilding companies can leverage their resources to respond adequately to external factors such as environmental uncertainty and organizational knowledge while taking full advantage of any support provided by the government. Hence, this study is relevant to the stakeholders in addressing some of the challenges currently facing the shipbuilding industry. The scope of this research which focuses on Sarawak alone is a major limitation of this paper. Future research could expand the scope to cover all the shipbuilding companies operating in Malaysia.

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