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<td>Author(s)</td>
<td>Lee, Taehwee; Yeo, Gi-Tae; Thai, Vinh V.</td>
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<tr>
<td>Citation</td>
<td>Lee, T., Yeo, G.-T., &amp; Thai, V. V. (2014). Structural analysis of port brand equity using structural equation modeling. The Asian journal of shipping and logistics, 30(3), 349-372.</td>
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<tr>
<td>Date</td>
<td>2014</td>
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<td>URL</td>
<td><a href="http://hdl.handle.net/10220/24675">http://hdl.handle.net/10220/24675</a></td>
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Structural Analysis of Port Brand Equity Using Structural Equation Modeling

Taehwee LEE** · Gi-Tae YEO*** · Vinh V. THAI****

I. Introduction

II. Literature Review and Research Hypotheses

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Abstract

Port competition, especially in the Northeast Asia (NEA) region, can be described as a price war. In this price competition, it is necessary to build up the brand concept to acquire higher market share. This paper aims to provide structural relationships for port brand equity (PBE) and explore the PBE stages statistically. The stages are divided into three steps: port service quality as the precedent of PBE, the PBE dimensions (brand awareness [BA] and brand loyalty [BL]), and the antecedent of PBE (overall value of brand equity [OVBE]). From a survey conducted with port users in Korea, the empirical results revealed several significant relationship: between tangibles (TA) dimension of port service quality and BL, between the empathy (EMP) dimension of port service quality and both BA and BL, and between BA and BL and OVBE. From the empirical analysis, this study suggests both managerial and academic contributions for port managers and scholars for further policy development and research in this important area.

Key Words: Port Brand Equity, B2B Brand Equity, Structural Equation Modeling, Port Service Quality

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* An earlier version of this paper was presented at the ICASL (International Conference of Asian Shipping and Logistics, Kobe, JAPAN) Conference 2013.

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I. Introduction

The market share of ports in the Northeast Asia (NEA) region, in particular container ports, has changed dramatically during the past decade. After the Great Hanshin earthquake in Japan in 1995, Kobe Port lost the competitive position while Busan Port solidified its position in the region. When most Asian countries experienced the financial crisis in 1997, Hong Kong was ranked the busiest port not only in Asia but also in the world. Since 1998, Singapore Port appeared as one of the major hub ports in the world with its strategic location close to the Straits of Malacca. Since the 2000s, Chinese ports such as Shanghai, Qingdao, and Shenzhen have remained in the world’s top port ranking.

In the port discipline, numerous researches describe port competition in NEA. Song (2002) discussed the competition and co-operation regarding Hong Kong Port and Shenzhen port. Several researchers in multi-criteria decision-making areas have attempted to point out the hierarchical measurement structure regarding port competitiveness (Song et al., 2004; Yeo et al., 2008; Yuen et al., 2012; Lirn et al., 2004). In particular, both Song et al. (2004) and Yeo et al. (2008) addressed port competitiveness criteria. Both studies suggested two common competitiveness attributes: connectivity and, hinterland condition. In the study by Ishii et al. (2013), they were concerned with the non-cooperative game theory when considering the case of Busan Port and Kobe Port competition. In their study, the findings showed that the sensitivity of demand fluctuates more whenever the rival port decreases its price.

In this fierce competition, price war is common (Levitt, 1980). In Busan Port, the unloading charge per twenty-foot equivalent unit (TEU) is a quarter of the cost in Tokyo, and less than half of Shanghai’s unloading charge per TEU. According to Levitt (1980), building up the brand equity (BE) based on the differentiated service can facilitate an efficient marketing tool under the price war. Webster and Keller (2004) argued
that industrial marketing managers can acquire competitive advantages using the brand concept.7)

Woo et al. (2011) reviewed port research trends since the 1980s and found that the propensity was mainly organized by both economics and operation topics.8) Yet the port marketing concept received little attention by scholars with only two studies highlighting its significance.9) With a similar context, the port choice behavior (PCB) topic has been highlighted by many studies.10) To date, the port brand (PB) concept still remains an under-researched area in the discipline. In this respect, only both the fishery harbors and airports have been reviewed by some scholars.11)

To address the above mentioned gap, we will construct a theoretical framework, and empirically explore the conceptual relationship model among port brand equity (PBE) stages. The PB concept can contribute to not only enhance efficient port operation but also facilitate an effective marketing tool.

The rest of the paper is organized as follows. In section II, we conceptualize the PBE by examining the industry features and reviewing related previous studies. Then, hypotheses, research questions and methodology are explained in section III, together with the design of the survey and analysis using structural equation modeling (SEM). Findings and discussion are presented in section IV, where we analyze empirically the relationships among the PBE stages. We then discuss managerial and academic implications in section V followed by suggestions for future research directions and a conclusion in section VI.

II. Literature Review

1. The Concept of Brand Equity

Although a few researchers suggested that structuring business-to-business (B2B) brands is unnecessary (Collins, 1977; Lorge, 1998),12)
many authors recognized the importance of the B2B brand. The study by Gordon et al. (1993) is perhaps the first to explore the BE in the B2B context. They proposed the B2B brand equity dimensions using a case of supply chain for electrical components. B2B brand equity dimensions have five organizational learning stages: brand birth, creation of brand awareness and association, building of quality and value perceptions, emergence of brand loyalty, and launching of brand extensions. Hutton (1997) explored the concept of BE in terms of organizational buying behavior. The study indicated that the B2B brand equity exists on an organizational buyer’s willingness to pay, and a well-known brand name is strongly related to the B2B brand equity. In his study, a “halo effect” was identified; for example, if an organizational buyer preferred a personal computer from a specific company, the buyer would also prefer the fax machine made from the same company. Mudambi (2000) also mentioned the importance of B2B branding. In Mudambi (2000)’s study, the respondent groups were divided among (1) highly tangible, (2) branding receptive, and (3) low interest to survey. Overall, respondents indicated that ordering and delivery service are the most important factors to branding. The highly tangible group showed that price is significant. The branding receptive group considered physical product properties as highly important branding attributes. The low interest group also considered ordering and delivery service as highly important criteria to branding. Baldauf et al. (2003) examined the BE dimensions using a case of medium-voltage electrical equipment. The BE dimensions were organized among brand awareness, perceived quality, and brand loyalty. Van Riel et al. (2005) also validated empirically the BE dimensions of specialty chemicals. The study revealed that product is close to product brand equity, and service is related to corporate brand equity. The product brand equity, then, causes the corporate brand equity, and both the product brand and corporate brand equity have a positive effect on loyalty intentions. Kunh et al. (2008) argued that B2B buyers consider brand more than business-to-consumer (B2C) buyers.

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13) Gordon et al.(1993)
14) Hutton(1997)
16) Van Riel et al.(2005)
17) Kuhn et al.(2008)
Turning our attention to the B2B service brand, several studies provide a framework regarding its relationship stages. Taylor et al. (2007) showed that insurance service brand equity includes (1) perceived quality, (2) perceived brand value, (3) brand attitude, (4) brand uniqueness, (5) brand satisfaction, and (6) loyalty intention. In the study by Davis et al. (2008), logistics BE was organized by both brand awareness and brand image. Biedenbach et al. (2011) presented the BE has (1) brand association, (2) perceived quality, and (3) brand loyalty. According to Kim et al. (2011), overall BE dimensions existed on (1) brand awareness with association, (2) perceived quality, and (3) brand loyalty.

2. Conceptualizing Port Brand Equity

In the BE context, Aaker’s (1991) definition is one of the most cited in foundational research. Aaker (1991) called BE a valuable asset that is affected by brand name, logo, and symbol. Yet, it is difficult to apply this definition on the PBE concept because the product is an intangible service.

To conceptualize the concept of PBE, it is imperative to review port industry features. According to Talley (2009), port stakeholders are divided into users and service providers. Port users are carriers, shippers, and passengers, whereas service providers are comprised of both port operators and other service providers. Other service providers included stevedores, ship’s agents, pilot, custom brokers, government, and local government. Considering the port industry features, we can understand the concept of PBE with regard to B2B concept.

Robinson (2002) suggested a new paradigm with regard to the role of port in a value-driven supply chain system. According to his study, a port provides a valuable service in the global supply chain: port to port and the whole trade process. The service provided by a port is therefore an intangible product. Accordingly, we can understand that PB is aligned with

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18) Taylor et al.(2007)
19) Davis et al.(2008)
20) Biedenbach et al.(2011)
21) Kim et al.(2011)
22) Chaudhuri et al.(2012); Tax et al.(1998); Srivastava et al.(1998); Rust et al.(2004); Yoo et al.(2000); Bharadwaj et al.(1993)
24) Talley(2009)
the service brand concept. As a result, the PBE concept can be interpreted by
the B2B service brand concept.

In this study, we define the PBE as follows. While the port customer is
provided service by the port, the customer may create specialized perception
regarding the port. We call this perception the PBE.

3. Port Service Quality (PSQ)

Many trials have been conducted to identify and recognize service
satisfaction levels and customer perception. As one of the attempts,
Parasuraman et al. (1988) explored service quality (SQ) measurements,
and then they viewed the SQ dimension as a SERVQUAL measurement
tool. The dimensions are divided into five groups: (1) tangibles, (2)
reliability, (3) responsiveness, (4) assurance, and (5) empathy.26) Since
their article was published, many authors cited its measurement structure
in their studies, while some other studies argued that the study of
Parasuraman et al. (1998) has serious statistical and theoretical problems
(Brown et al. 1993; Buttle, 1996).27) In spite of these arguments, no author
has argued the importance of SQ across business sectors, including in the
port industry.

Turning our attention to the port research context, Robinson (2002)
caused a turning point in the port discipline by suggesting a new role for
ports, especially in the value chain system. Since the advent of this study,
a number of studies devised the port and terminal integration, taking into
account the global supply chain (GSC).28) These studies highlighted the
importance of value-added service and integrated port service. Yeo et al.
(2008) found that port competitiveness attributes had changed from
hardware, including facility and location, to service criteria.29)

Nevertheless, researches relevant to the port service context are rare. Ha
(2003) identified port service quality (PSQ) using the case of Korean
ports.30) The PSQ includes (1) information availability, (2) location, (3)
turnaround time, (4) available facilities, (5) port management, (6) cost, (7)
convenience. Pantouvakis (2006) explored PSQ in terms of passenger

26) Parasuraman et al. (1988)  
27) Brown et al. (1993); Buttle (1996)  
28) Song et al. (2008); Tongzon et al. (2009); Panayides et al. (2008)  
29) Yeo et al. (2008)  
terminal. In his study, service is the most important attribute, followed by security, safety, cleanliness, guidance communication, parking facility, and information.\textsuperscript{31) Ugboma et al. (2007)} viewed PSQ as SERVQUAL which includes tangibility, reliability, responsiveness, assurance, and empathy.\textsuperscript{32) Woo et al. (2011)} validated the port’s role as a result of a changing environment. In this connection, the service criterion is more influencing than both the operation and logistics criteria.\textsuperscript{33) A number of studies have measured PSQ attributes, but none emphasize the positive relationship between PSQ levels and PBE stages.}

### III. Methodology

**1. Research Hypotheses**

Because several studies have different purposes, it is difficult to extract the common PBE stages: the precedents of PBE, PBE dimensions, and the antecedents of PBE. This is reflected in Table 1.

<table>
<thead>
<tr>
<th>Study</th>
<th>Precedents of PBE</th>
<th>PBE dimensions</th>
<th>Antecedents of PBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim et al. (2011)</td>
<td>Marketing mix; channel, price, promotion, and after-sales service</td>
<td>Corporate image, brand awareness with associations, perceived quality, brand loyalty</td>
<td>Overall value of brand equity</td>
</tr>
<tr>
<td>Yoo et al. (2000)</td>
<td>Price, store image, distribution intensity, advertising spending, price deals</td>
<td>Perceived quality, brand loyalty, brand awareness/associations</td>
<td>Brand equity</td>
</tr>
<tr>
<td>Davis et al. (2008)</td>
<td>–</td>
<td>Brand awareness, brand image,</td>
<td>Brand equity</td>
</tr>
<tr>
<td>Van riel et al. (2005)</td>
<td>Information, personnel</td>
<td>Service</td>
<td>Corporate brand equity</td>
</tr>
<tr>
<td>Baldauf et al. (2003)</td>
<td>–</td>
<td>Brand awareness, perceived quality, brand loyalty</td>
<td>Profitability performance, market performance, customer value</td>
</tr>
<tr>
<td>Chaudhuri et</td>
<td>Brand trust, brand</td>
<td>Purchase loyalty,</td>
<td>Market share, relative</td>
</tr>
</tbody>
</table>

\textsuperscript{31) Pantouvakis(2006)}  
\textsuperscript{32) Ugboma et al.(2007)}  
\textsuperscript{33) Woo et al.(2011)}
Nevertheless, this study extracted the PBE dimensions of brand awareness and brand loyalty, as adapted from Aaker (1996), Yoo et al. (2000), Yoo et al. (2001), Bendixen et al. (2004), Baldauf et al. (2003) and Kim et al. (2011).34)

Berry (2000) showed that when an intangible product has an emotional effect on customers, the service company can be regarded as the brand.35) Gordon et al. (1993) proposed that service quality can positively affect service brand.36) Kayaman et al. (2007)37) adopted the dimensions of SERVQUAL and explored the positive relationships between SERVQUAL and the BE dimensions of brand loyalty and, brand image. Thus, in this study, we hypothesize as follows:

H1: Tangibility has a positive effect on brand awareness
H2: Tangibility has a positive effect on brand loyalty.
H3: Responsiveness has a positive effect on brand awareness.
H4: Responsiveness has a positive effect on brand loyalty.
H5: Reliability has a positive effect on brand awareness.
H6: Reliability has a positive effect on brand loyalty.
H7: Assurance has a positive effect on brand awareness.
H8: Assurance has a positive effect on brand loyalty.
H9: Empathy has a positive effect on brand awareness.
H10: Empathy has a positive effect on brand loyalty.

A number of studies commonly regard the BE results as an overall value of the brand equity.38) Both brand awareness and brand loyalty can be positively connected to the OVBE (Yoo et al., 2002; Kim et al., 2011).39) Thus, we hypothesize the following:

---

34) Aaker(1996); Yoo et al.(2000; 2001); Bendixen et al.(2004); Baldauf et al.(2003); Kim et al.(2011)
35) Berry(2000)
36) Gordon et al.(1993)
37) Kayaman et al.(2007)
38) Kim et al.(2011); Yoo et al.(2002); Baumgarth et al.(2010)
39) Yoo et al.(2002); Kim et al.(2011)
H_{11}: Brand awareness has a positive effect on the overall value of the brand equity.

H_{12}: Brand loyalty has a positive effect on the overall value of the brand equity.

By hypothesizing several research propositions, this study suggests the structural research framework as depicted in Figure 1. This study will show the PSQ as the affecting attributes of the PBE, and both BA and BL as the PBE dimensions. The OVBE will be shown as the antecedents of PBE.

2. Questionnaire Design and Data Sampling

To examine the PBE stages, this study selected the following eight variables: (1) tangibility, (2) responsiveness, (3) reliability, (4) assurance, (5) empathy, (6) brand awareness (BA), (7) brand loyalty (BL), and (8) overall value of brand equity (OVBE). Also, 25 measurement items were drawn from previous studies (see Table 2). Each measurement was evaluated using a five-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree) in response to the questions: “How would you rate the satisfaction of the following in the main port that you are using?”
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Table 2: Measurement items

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Measurement items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangibility</td>
<td>TA1 Excellent physical infrastructure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TA2 Modern equipment and facilities.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TA3 Available equipment and facilities.</td>
<td></td>
</tr>
<tr>
<td>Responsiveness</td>
<td>RES1 Cargo receipt and delivery activities in a timely manner.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RES2 Handling claims quickly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RES3 Providing fast customs service.</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>REL1 Meeting our services requirement.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REL2 Providing sufficient information about the schedule and time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REL3 Providing service in a consistent manner.</td>
<td></td>
</tr>
<tr>
<td>Assurance</td>
<td>ASS1 Excellent shipment track and trace capability.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASS2 Producing error-free invoices and related documents.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASS3 Ensuring safety and security for ships/shipments.</td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>EMP1 Providing service in a reliable manner.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMP2 Providing value added services.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMP3 The staff demonstrates professional attitude and behavior.</td>
<td></td>
</tr>
<tr>
<td>Brand awareness</td>
<td>BA1 The main port is more familiar than other ports.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BA2 We can remember easily the service in the port that we are using.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BA3 The main port is more recognizable than other ports.</td>
<td></td>
</tr>
<tr>
<td>Brand loyalty</td>
<td>BL1 We will recommend the port to other companies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL2 We will use the service of the main port repeatedly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL3 We prefer the main port rather than other ports.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL4 Although, the port charges are more expensive than other ports, we will still choose the main port that we are using.</td>
<td></td>
</tr>
<tr>
<td>Overall value of brand equity</td>
<td>OVBE1 We are very satisfied with the main port</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OVBE2 We trust the service in the main port.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OVBE3 The port brand equity of the main port is more valuable than those of other ports.</td>
<td></td>
</tr>
</tbody>
</table>

The survey targeted port users, (shippers, in this case), in Korea. To approach several shippers in Korea, we contacted major logistics companies and container terminals in Korea, namely, Dongbu, Glovis, SAEBANG, and CJ-Korea Express, and then their respective company members distributed the questionnaires to their customers. The survey was
sent to 221 users from April 1st to May 31st, 2013. A total of 109 questionnaires were collected with a response rate of 49.3%.

The profile of respondents provided in Figure 2. To avoid save time and collect questionnaires easily, this survey did not ask any demographic information such as job title, working experience, type of business, annual handled cargo, and etc. The ports used by the respondents were comprised of Busan (27.5%), Gwangyang (11.9%), Incheon (35.8%), Pyeongtaek (15.6%), Dangjin (0.9%), others (7.3%), and non response (0.9%).

Figure 3 shows the port choice decision mechanism, which is constituted mainly by deciding the main port used directly (n = 58, 53.2%) and via freight forwarder (n = 48, 44.0%). The rest of the numbers are non-responses (n = 3, 2.8%).
3. Research Methods

The aim of this research is to validate empirically the PBE stages: the affecting attributes of PBE, the PBE dimension, and the antecedents of PBE. For accomplishing the research purpose, this study first adopts confirmatory factor analysis (CFA) to examine the validity of the 25 observed measurements. Second, this study also analyzes the PBE stages of the structural research framework using SEM to draw out the significant findings conducting AMOS 18.0 to verify the 12 research hypotheses. As the empirical analysis in this study, Anderson and Gerbing (1988) suggested the two-step approach: the validation using CFA and the verification using SEM.\(^{40}\)

IV. Empirical Analysis

1. Results of the Reliability Test and Correlation Analysis

To identify the structure analysis of PBE stages, this section first confirms the reliability test using the Cronbach alpha value. As shown in Table 3, all the Cronbach alpha values in the test are greater than 0.7, therefore, the results are demonstrated to confirm the adequate reliable threshold (Nunnally, 1978).\(^{41}\) Also, all the correlation coefficients are significant at 0.01 confidence level.

\(<\text{Table 3}>\) Reliability test and correlation analysis results

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Cronbach alpha</th>
<th>Range of correlation coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangibility</td>
<td>TA1</td>
<td>3.35</td>
<td>0.956</td>
<td>0.923</td>
<td>0.774 - 0.840*</td>
</tr>
<tr>
<td></td>
<td>TA2</td>
<td>3.32</td>
<td>0.901</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TA3</td>
<td>3.31</td>
<td>1.016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsiveness</td>
<td>RES1</td>
<td>3.37</td>
<td>0.899</td>
<td>0.855</td>
<td>0.575 - 0.713*</td>
</tr>
<tr>
<td></td>
<td>RES2</td>
<td>3.54</td>
<td>0.938</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RES3</td>
<td>3.39</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{40}\) Anderson and Gerbing(1988)  
\(^{41}\) Nunally(1978)
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<table>
<thead>
<tr>
<th>Reliability</th>
<th>REL1</th>
<th>3.49</th>
<th>0.765</th>
<th>0.748</th>
<th>0.447 - 0.561*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REL2</td>
<td>3.09</td>
<td>0.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REL3</td>
<td>3.46</td>
<td>0.887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assurance</td>
<td>ASS1</td>
<td>3.55</td>
<td>0.938</td>
<td>0.812</td>
<td>0.546 - 0.645*</td>
</tr>
<tr>
<td></td>
<td>ASS2</td>
<td>3.54</td>
<td>0.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASS3</td>
<td>3.58</td>
<td>0.946</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>EMP1</td>
<td>3.61</td>
<td>0.827</td>
<td>0.827</td>
<td>0.598 - 0.652*</td>
</tr>
<tr>
<td></td>
<td>EMP2</td>
<td>3.21</td>
<td>0.840</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMP3</td>
<td>3.43</td>
<td>1.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brand awareness</td>
<td>BA1</td>
<td>3.72</td>
<td>0.848</td>
<td>0.895</td>
<td>0.690 - 0.778*</td>
</tr>
<tr>
<td></td>
<td>BA2</td>
<td>3.55</td>
<td>0.799</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BA3</td>
<td>3.55</td>
<td>0.877</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brand loyalty</td>
<td>BL1</td>
<td>3.49</td>
<td>0.867</td>
<td>0.871</td>
<td>0.522 - 0.821*</td>
</tr>
<tr>
<td></td>
<td>BL2</td>
<td>3.52</td>
<td>0.888</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL3</td>
<td>3.65</td>
<td>0.937</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL4</td>
<td>3.20</td>
<td>1.034</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall value of brand equity</td>
<td>OVBE1</td>
<td>3.56</td>
<td>0.917</td>
<td>0.886</td>
<td>0.715 - 0.751*</td>
</tr>
<tr>
<td></td>
<td>OVBE2</td>
<td>3.62</td>
<td>0.779</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OVBE3</td>
<td>3.49</td>
<td>0.909</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *All correlations are significant at the $p < 0.01$, TA: tangibility, RES: responsiveness, REL: reliability, ASS: assurance, EMP: empathy, BA: brand awareness, BL: brand loyalty, OVBE: overall value of brand equity

### 2. Confirmatory Factor Analysis

The rest of the foundation analysis is tested by CFA. CFA is also used mainly to evaluate unidimensionality. As shown in Table 5, we can extract the significant guidelines of several values. Most of all, unidimensionality can be tested by goodness of fit indices (GFIs) and root mean square error of approximation (RMSEA). If the GFIs are greater than 0.90, the scores are accepted reasonably. If the RMSEA score is lower than 0.10 the fitness result is at the adequate level. The results of CFA fit indices in this study meet the requirements of the acceptable level (GFI = 0.801, CFI = 0.953,
TLI = 0.943, RMSEA = 0.063, SRMR = 0.0445). The normed Chi-Square ($\chi^2/df$) also shows a reasonable score.42)

<table>
<thead>
<tr>
<th>$\chi^2/df$</th>
<th>GFI</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.434</td>
<td>0.801</td>
<td>0.953</td>
<td>0.943</td>
<td>0.063</td>
<td>0.0445</td>
</tr>
</tbody>
</table>

Table 4: CFA fit indices results

<table>
<thead>
<tr>
<th>Indices</th>
<th>Recommended</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2/df$</td>
<td>&lt; 2.00 (Acceptable)</td>
<td>Bentler (1988); Segars and Grover (1998)</td>
</tr>
<tr>
<td>Goodness of fit index (GFI)</td>
<td>&gt; 0.90 (Acceptable)</td>
<td>Chau (1997)</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>&gt; 0.90 (Acceptable)</td>
<td>Garver and Mentzer (1999); Zhang et al. (2002)</td>
</tr>
<tr>
<td>Tucker and Lewis index (TLI)</td>
<td>&gt; 0.90 (Acceptable)</td>
<td>Garver and Mentzer (1999)</td>
</tr>
<tr>
<td>Root means square error of approximation (RMSEA)</td>
<td>0.05-0.08 (Acceptable)</td>
<td>Ha et al. (2011)</td>
</tr>
<tr>
<td>Standardized root mean square residual (SRMR)</td>
<td>&lt; 0.08 (Acceptable)</td>
<td>Hu and Bentler (1999)</td>
</tr>
</tbody>
</table>

Figure 4: Measurements models (standardized factor loadings and correlation coefficients)


3. Results of Hypotheses Testing

Given the structural research model, the path analysis is conducted to verify the proposed research hypotheses. Looking at GFIIs in path analysis, most indices satisfy the acceptable level (CFI = 0.953, TLI = 0.945, RMSEA = 0.063, SRMR = 0.0447) except GFI (0.798), however, the Chi-Square is significant at the 0.000 level ($\chi^2 = 360.334$, df = 253).

Looking at Table 6, only four hypotheses have been accepted among the proposed research hypotheses (H2, H9, H10, H11, and H12). Specifically, tangibility has positive relationships with BL (estimate = 0.227, C.R > 1.96). Empathy is related significantly with both BA (estimate = 1.089, C.R > 1.96) and BL (estimate = 0.745, C.R > 1.96). The result of the positive relationship between both PSQ dimensions; tangibility and empathy, and BL is the same with the one in a previous study (Kayaman et al., 2007). Both BA and BL were found to have significant relationships with the OVBE (estimates = 0.298 and 0.959, respectively, C.R > 1.96).

<table>
<thead>
<tr>
<th>Estimate</th>
<th>S.E</th>
<th>C.R</th>
<th>P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>0.209</td>
<td>0.183</td>
<td>1.140</td>
<td>0.254</td>
</tr>
<tr>
<td>H2</td>
<td>0.227</td>
<td>0.113</td>
<td>1.996</td>
<td>0.046</td>
</tr>
<tr>
<td>H3</td>
<td>-0.764</td>
<td>0.526</td>
<td>-1.453</td>
<td>0.146</td>
</tr>
<tr>
<td>H4</td>
<td>-0.249</td>
<td>0.271</td>
<td>-0.918</td>
<td>0.358</td>
</tr>
<tr>
<td>H5</td>
<td>0.490</td>
<td>0.792</td>
<td>0.619</td>
<td>0.536</td>
</tr>
<tr>
<td>H6</td>
<td>0.025</td>
<td>0.440</td>
<td>0.058</td>
<td>0.954</td>
</tr>
<tr>
<td>H7</td>
<td>-0.092</td>
<td>0.776</td>
<td>-0.119</td>
<td>0.905</td>
</tr>
<tr>
<td>H8</td>
<td>0.107</td>
<td>0.455</td>
<td>0.234</td>
<td>0.815</td>
</tr>
<tr>
<td>H9</td>
<td>1.089</td>
<td>0.582</td>
<td>1.869</td>
<td>0.062</td>
</tr>
<tr>
<td>H10</td>
<td>0.745</td>
<td>0.373</td>
<td>2.000</td>
<td>0.045</td>
</tr>
<tr>
<td>H11</td>
<td>0.298</td>
<td>0.105</td>
<td>2.830</td>
<td>0.005</td>
</tr>
<tr>
<td>H12</td>
<td>0.959</td>
<td>0.143</td>
<td>6.721</td>
<td>***</td>
</tr>
</tbody>
</table>

Notes) S.E : Standard error, C.R : Critical ratio, ***Significant at the $p < 0.01$

43) Kayaman et al.(2007)
V. Managerial and Academic Implication

In this empirical study, the results show the following key findings. Some PSQ attributes can have a positive effect on both BA and BL. Specifically, tangibility has a positive influence on BL, while empathy is positively related to both BA and BL. Among the PBE dimensions, all the hypotheses are correlated significantly to the antecedents of PBE, overall value of brand equity. This results of this study have both academic and managerial implications.

Most of all, the results of this study make some contribution to both port operators and port marketing managers. In all PSQ attributes, only two attributes, tangibility and empathy, are related positively to PBE dimensions. Thus, both of these port stakeholders should focus on these two key service attributes, not only tangibility but also empathy. In terms of tangibility attributes, the main key performance indicators (KPIs) are related to physical facilities and equipment. Thus, port marketing management and port brand management practitioners should focus on physical attributes of the port. These findings are in line with B2B brand
A port is an asset-intensive service platform where specialized cargo handling equipment and physical facilities such as berths, warehouses, and cargo freight stations are needed to provide essential services to port customers such as shipping lines and freight forwarders. Hence, this “hard” component will always play a major role in determining the PBE through customer awareness and loyalty. This essential link will therefore help port managers and operators determine the importance of strategic investment in facilities and equipment to enhance the port’s service level and thus customer awareness and satisfaction.

Regarding empathy attributes, the results can be translated by providing value-added services to the customers and increasing the professionalism level of port staff. According to the survey respondents, customers prefer the port’s core and value-added services to be provided in a reliable manner by port employees who demonstrate professional behavior. Thus, to attract new customers and retain loyal customers, it is necessary to continuously enhance the skills and professionalism of port employees for both port authorities (PA) and port operators. This implies the appropriate education and training of port employees not only on the “hard” port operation skills but also on the “soft” aspect such as the fundamentals of customer service management and business ethics.

Finally, all port stakeholders can approach the port brand concept using these key findings and use the efficient marketing tools reflecting the brand concept. Overall, the findings of this study indicate that port management will need to focus on not only the strategic investment in port facilities and equipment, but also the development of their intangible resource to make customers aware of the port brand and thus enhance its brand equity.

In terms of academic contribution, this study helps to address an important gap in the existing literature on port studies. To date, the focus of port researches was mainly comprised of operations management and economic issues (Woo et al., 2011). Some scholars have tried to introduce the study of port marketing management or PCB. The concept of PBE, however, has never been examined as one of the main port research

44) Yeo et al. (2008); Chang et al. (2008)
45) Woo et al. (2011)
VI. Conclusions

The port competition in the NEA region is fierce. In particular, the competition can be summarized by price competition, and price competition has been receiving much attention by academic and industry practitioners.

Nevertheless, the previous studies related to the port topic have been biased by operations and economics issues, while the brand concept as an efficient marketing tool under price competition has never been explored.

This study therefore sheds light on providing the structural framework of the PBE and validate empirically the PBE stages. To set up the conceptual framework, this study reviewed related studies on BE and PSQ and extracted the PBE stages from them. The stages were divided into three steps: the precedents of PBE (PSQ), the PBE dimensions (BA and BL), and the antecedents of PBE (OVBE).

From the empirical study, we found several significant positive relationship: TA and BL (H2), EMP and BA (H8), EMP and BL (H9), EMP and BA (H10), BA and OVBE (H11), and BL and OVBE (H12). Taking into consideration the empirical results, we suggested both academic and managerial implications, with the special focus on the physical infrastructures (tangibility) and employees’ professional attitude and behavior (empathy). This study is limited, however, in the context of a single country and therefore may be subject to some survey biases. Hence, one of the directions for future research includes the replication of this study in other countries or regions where port competition is in the same stage as the one discussed in this study. Another direction of future research is to examine the structural linkage between the level of a port’s brand awareness and its performance.*
Acknowledgment

This work was supported by the Incheon National University (International Cooperative) Research Grant in 2013

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