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## Exploration of Research Trends in The Journal of Distribution Science Using Keyword Analysis\*

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### Abstract

**Purpose** – The purpose of this study is to find out research directions for distribution and fusion and complex field to many domestic and foreign researchers carrying out related academic research by confirming research trends in the Journal of Distribution Science (JDS).

**Research Design, Data, and Methodology** – To do this, I used keywords from a total of 904 papers published in the JDS excluding 19 papers that were not presented with keywords among 923. The analysis utilized word clouding, topic modeling, and weighted frequency analysis using the R program.

**Results** – As a result of word clouding analysis, customer satisfaction was the most utilized keyword. Topic modeling results were divided into ten topics such as distribution channels, communication, supply chain, brand, business, customer, comparative study, performance, KODISA journal, and trade. It is confirmed that only the service quality part is increased in the weighted frequency analysis result of applying to the year group.

**Conclusion** – The results of this study confirm that the JDS has developed into various convergence and integration researches from the past studies limited to the field of distribution. However, JDS's identity is based on distribution. Therefore, it is also necessary to establish identity continuously through special editions of fields related to distribution.

**Keywords:** Research Trend, Distribution Journal, Keywords Analysis, Word Clouding, Topic Modeling.

**JEL Classifications:** C60, C89, D39, M10, N01.

### 1. Introduction

Recently, media reports on the non - morality of ghost conferences and ghost conferences such as WASET(World Academy of Science, Engineering and Technology) and OMICS International have been published as social reprimands for the ethics and intentions of domestic researchers. In this situation, many institutes are making

efforts for development together with the role of the journal and the ethics of the ethical standards, and the researchers are also participating in the efforts of the institutes.

As of May 21, 2019, there are a total of 9,393 registered institutions in the Korea Citation Index (KCI), and 3,749 academic associations were reported among these (KCI, 2019). According to KCI statistics, there are a total of 2,339 KCI journals (including candidate journals) of 5,549 registered journals. Among them, the total number of academic journals in the humanities and social sciences was 1,702, accounting for 69.8% of the total.

The Journal of Distribution Science (JDS) which is adopted as an analysis subject in this study is the leading academic journal of Korean distribution science society established in 1999 and applied as Scopus indexed since January, 2016. Currently, the JDS which aims to study convergence and integration studies is the largest academic journal in the field of humanities and social sciences in Korea. The reason why this study is interested in the research of distribution science is as follows. First, the JDS

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is a representative journal which is actively responding to rapid changes in the distribution industry in the field of distribution. Second, KODISA (Korea Distribution Science Association) which publishes JDS presented the journal development strategy from 2015 (Youn, Lee, Kim, Yang, Hwang, Kim, & Lee, 2015) because of the importance of unethical ghost society issues and the ethics of researchers in advance, and operates to clearly establish compliance with publishing ethics such as plagiarism (Hwang, Lee, Lee, Kim, Yang, Youn, & Kim, 2015). Third, the JDS is considered to be a representative academic journal for the future development of academic journals (Hwang, Lee, Youn, Kim, Lee, Shin, Kim, Kim, Lee, & Kim, 2017; Hwang, Shin, Lee, Kim, Lee, Kim, Kim, Lee, Suh, Kang, Seo, Kim, Zhang, Su, & Youn, 2018). Interestingly, JDS recently has been strategically addressing distribution-related topics such as retailer brand, retail policy, in-store merchandising and retail management on a monthly basis. These efforts have the advantage of enabling specific research related to retail distribution. However, in order to supplement the shortcomings of research beyond the retail sector, IJIDB (International Journal of Industrial Distribution & Business), another journal run by KODISA, is used to supplement the subject of industrial distribution and industrial management in general.

The Journal is a mirror of practical interest as well as theoretical interest in the discipline, and the journal is not only a beacon to tell the direction of the theory system and research method, but also it is very important to analyze the articles published in the journal in that it is a historical record that contains the footprints that have changed and developed (Kim, Jeong, Kwan, Lee, & Kim, 2011). In this respect, the JDS has published a research trend analysis (Kim, Kim, & Youn, 2010) in 2010, and the research that establishes the future strategy for KODISA related journals from 2017 (Hwang et al., 2017; Hwang et al., 2018), but it is an unsatisfactory point that the JDS's research trend has not been thoroughly reviewed.

The purpose of this study is to investigate the research trends of the JDS which is the largest academic journal for distribution, convergence and integration field to many domestic and foreign researchers carrying out related academic research by confirming research trends. This study I tried to confirm the research trend by analyzing various test such as text mining, weighted frequency analysis, topic modeling and so on for a total of 923 papers published in 2018 from the 2004 paper in which keywords were registered in the JDS.

The results of this study will provide a variety of issues to make the JDS which is the largest publication in the distribution field become a world-class academic journal, and that researchers in the field of distribution will be able to quote research on the JDS and present opportunities for better research results. As a result of frequency analysis, 12 to 20 articles were published annually from 2004 to 2010,

and the number of articles was increased from 36 in 2010 to 91 in 2013 and more than 100 articles were published since 2014.

## 2. Research Method

### 2.1. Subject of Research

As mentioned previously, a total of 904 papers out of a total of 923 papers published in the JDS excluding the 19 papers with no keywords were analyzed. Therefore, this study tried to identify the change of trend after classifying the year into three groups after analyzing the whole.

**Table 1:** Results of Frequency Analysis

Year	Publish Frequency	Year	Publish Frequency
2004	13	2012	64
2005	13	2013	91
2006	16	2014	124
2007	12	2015	136
2008	12	2016	157
2009	20	2017	109
2010	19	2018	101
2011	36	Total	923

### 2.2 Research Procedure

This study used a web crawling on KODISA homepage to conduct the research but failed to search and index the abstracts and keywords together and tried to analyze them through the following procedure. First, I performed the coding work to transfer the title and keywords of the JDS list to a spreadsheet. Second, the word clouding was performed during text mining after reviewing previous studies (Choi No Reference 2017; Kang, Kim, & Choi, 2018; Kim & Jin, 2013; Woo & Chang, 2016). The analysis visualized the results using the wordcloud package and the RColorBrewer package provided by R. Prior to the analysis, white space is used in the keyword for the analysis. Since word clouding is a process to see overall trends, I excluded the publication year from the analysis and use only keywords. The frequency of keywords was extracted from corpus using VCorpus, which generates volatile corpus, and word.freq was extracted by creating DocumentTermMatrix. Also, by sorting the word.freq, the keywords are sorted in the order of high frequency to confirm the top 20 keywords. Third, the topics of the keywords were identified through topic modeling which is frequently used in text mining. To do this, topic modeling on all articles were tried in the JDS, naming them for each topic, and classifying them into year groups for the purpose of confirming the phenomenon. Topic modeling is a statistical model for finding hidden topics in a document

based on the LDA (Latent Dirichlet Allocation) algorithm (Blei, Andrew, & Jordan, 2003; Blei & Lafferty, 2007; Kang et al., 2018). This study also extracted the topic modeling results using the LDA package provided by R. The LDA algorithm, which complements the disadvantages of the LSA algorithm, is an algorithm that can derive a higher classification success rate using the Gibbs sampling method. However, the LDA needs to find out the number of topics by the researcher and find out the most optimal number of topics K through several analyzes. There is also a disadvantage that the researcher must specify the topic name, but it is known that better insight can be derived from frequency analysis. Many previous studies (e.g. Hwang & Hwang, 2018; Kang et al., 2018; Kim & Kim, 2019) also used topic modeling. The extraction process which applies samples to three algorithms to find topics among the lean documents among the functions provided in the LDA package is using `lda.collapsed.gibbs.sampler` based on the study of Kang(2016). This is to estimate the distribution of the keywords which is a probabilistic model of what subjects exist in each document for a given document by topic using LDA. Through this process, it is expected to derive various topics of the JDS. Fourth, weighted frequency analysis was carried out to confirm the change of keywords classified into three groups. This is because the result of analyzing by topic modeling by year group does not have a time series meaning as mentioned above. Instead, it is expected that it will be possible to confirm which keyword is important for each year group by analyzing the ratio of major keywords based on the whole keywords of the year group.

### 3. Research Results

#### 3.1. Word Frequency Analysis and Word Clouding

The results of the word frequency analysis and the word clouding for the papers published in the JDS are shown in <Figure 1> and <Table 2>.



Figure 1: Word Cloud for Keywords

The results of keyword frequency analysis are as follows. A total of 3,242 corpus were extracted from more than 900

papers published in the JDS for the past 15 years. It was confirmed that the JDS mainly deals with what kind of keywords such as "Customer satisfaction" keywords appear 33 times (3.58%), "traditional market" appears 23 times (2.5%), and "job satisfaction" appears 17 times (1.84%) as shown in <Table 2>. This result means that the JDS is a convergence and integration journal covering not only distribution but also various disciplines. However, the frequency analysis itself is not sufficient to explain the trend of the articles keyword because of the most frequent keyword 'customer satisfaction' accounts for a very small portion of the total theses keywords. Therefore, specific topics of 3003 keywords were extracted through topic modeling and to confirm research trends in the JDS.

Table 2: Frequency Analysis for Keywords

Rank	Keyword	Fre.	Rank	Keyword	Fre.
1	Customer Satisfaction	33	11	Brand Attitude	11
2	Traditional Market	23	11	Customer Loyalty	11
3	Job Satisfaction	17	11	Franchise	11
3	Purchase Intention	17	11	Revealed Comparative Advantage	11
3	Service Quality	17	11	Trade Specialization	11
6	Satisfaction	16	16	China	10
7	Trust	14	16	Corporate Social Responsibility	10
8	Brand Image	13	16	Loyalty	10
9	Distribution	12	16	Perceived Value	10
9	Repurchase Intention	12	20	Brand Equity	9

Note) Fre. : Frequency

#### 3.2 Topic Modeling

Topic modeling is a statistical technique for analyzing words in the original text to understand the subject of the document. It is a technique for classifying documents based on the relationship between sentences and words under the assumption that the documents are composed of various topics (Won & Kim, 2014). Topic modeling is used for keyword analysis in this study because it performs not only the subject classification but also the additional function such as finding the homonyms as well as reducing the dimension of the word. Also, the process of determining the number of topics determines whether the difference in perplexity is the smallest (Ryu, 2018), or the maximum number of subjects can be determined from the maximum parameters through the method of Griffiths & Devedaud or the minimum parameters from the method of CaoJuan & Arun (Griffiths & Steyvers, 2004; Grun & Hornik, 2011). In addition, it is known that the appropriate topic number can be determined from researchers' intuition (Kang et al., 2018).

The results of deriving all the published articles in the JDS into 10 topics are shown in <Table 3>. As a result of the analysis, <Topic 1>, named as 'distribution channel', is

consisted of franchise, distribution, and traditional market. <Topic 2>, named as 'communication', is composed of word of mouth, marketing communication, and social media so on. <Topic 3>, named as 'supply chain', is consisted of SCM, supply chain, etc. <Topic 4>, named as 'brand', is consists of brand image, brand attitude, brand loyalty. <Topic 5>, named as 'business', is consists of business model, small enterprise, cash management, etc. <Topic 6>, named as 'customer', is consists of customer satisfaction, customer loyalty, customer value, etc.

<Topic 7>, named as 'comparative study', is consists of China, Japan, India, Korea, etc. <Topic 8>, named as

'performance', is consists of job satisfaction, organizational commitment, turnover intention, etc. <Topic 9>, named as 'KODISA Journals', is consists of JAFEB, EAJBM, JDS, etc. Finally, <Topic 10>, named as 'trade', is consists of trade specialization, trade structure, trade intensity, etc. However, it was confirmed that there is no statistically significant association between more than two words in the result of association rule analysis of keywords.

On the other hand, the topic modeling results classified into three year groups are as follows. For each topic, only three keywords for each year group are presented in <Table 4>.

**Table 3:** Some terms of 10 topics

Topic1 (Distribution channel)	Topic2 (Communication)	Topic3 (Supply chain)	Topic4 (Brand)	Topic5 (Business)
franchise	word of mouth	supply chain collaboration	purchase intention	social capital
commitment	corporate social responsibility	information sharing	brand image	business performance
distribution	data mining	scm	satisfaction	business model
revisit intention	hedonic value	supply chain management	brand attitude	corporate governance
traditional markets	korean wave	store loyalty	loyalty	franchise system
conflict	behavioral economics	performance	perceived value	environment
dea	construal level theory	consignment	brand equity	export performance
distribution channel	marketing communication	distribution science	consumer attitude	IPA
flow	moderating role	management	perceived quality	market orientation
management efficiency	social distance	service satisfaction	repurchase intention	small enterprise
marketing	social enterprise	service quality	trust	lifestyle
psychological distance	social media	convenience store	brand loyalty	autonomous co-creation
recontract intention	social value	CSR	customer satisfaction	brand agricultural products
social presence	utilitarian value	opportunism	attitude	cash management
online shopping	conspicuous consumption	service value	brand awareness	confidence
Topic6 (Customer)	Topic7 (Comparative study )	Topic8 (Performance)	Topic9 (KODISA Journals)	Topic10 (Trade)
customer satisfaction	china	job satisfaction	marketing strategy	revealed comparative advantage
customer loyalty	japan	traditional market	efficiency	trade specialization
service quality	india	organizational commitment	retail industry	trade structure
traditional market	korea	self efficacy	consumer behavior	trade intensity
discount store	SCM	turnover intention	distribution industry	market share
corporate social responsibility	repurchase intention	trust	and business jafeb	competition
consumption emotion	buying intention	innovation	capital structure	discount stores
shopping value	comparative study	emotional labor	east asian journal of business management	organizational culture
relationship quality	distribution channels	visual merchandising	economics	steel distribution industry
customer value	economic growth	authentic leadership	international journal of industrial distribution and business iijdb	car industry
department store	foreign direct investment	Chinese consumers	journal of distribution science	cee
consumer	FTA	creativity	journal of finance	customer oriented selling behavior
customer participation	investment	CRM performance	korea distribution of science association	data envelopment analysis
consumer behavior	social responsibility	department stores	logistics hub strategies	determinants
behavior intention	marketing strategy	emotional intelligence	north east asia	dissatisfaction

### 3.3. Frequency Analysis of Year Group Keywords Using Weights

The frequency analysis results for all keywords are

presented in <Table 2> above. However, it is necessary to analyze by year group in order to confirm the research trend of the JDS. The results of frequency analysis by year group are shown in <Table 5> and <Figure 2>.

**Table 4:** Results of keyword trend search by year using topic modeling

	2004~2009(69 papers)	2010~2013(210 papers)	2014~2018(625 papers)
Topic 1	circumstance surrounding drug stores	service quality	china
	controllability of the cause	store loyalty	supply chain collaboration
Topic 2	department stores	discount store	japan
	business model	marketing strategy	job satisfaction
	commitment	corporate governance	organizational commitment
Topic 3	franchise	data mining	turnover intention
	pharmaceutical industry	traditional market	customer satisfaction
	distribution system	business performance	repurchase intention
Topic 4	efficiency	buying intention	customer loyalty
	agricultural	franchise	distribution science
	agrofood	word of mouth	supply chain
Topic 5	already built market	perceived usefulness	self efficacy
	customer satisfaction	consumer attitude	satisfaction
	relationship marketing	purchase intention	brand image
Topic 6	trust	brand image	revealed comparative advantage
	distribution	traditional market	evaluation model
	marketing	Chinese consumers	retail competition
Topic 7	4sshop	consumers value	social distance
	discount store	information sharing	service quality
	merchandising	art marketing	corporate social responsibility CSR
Topic 8	traditional market	asset specificity	dea
	alternative choice	SSM	traditional market
	attribute information	performance	relationship quality
Topic 9	attribute intensifying	small businesses	word of mouth
	scm	innovation	retail industry
	service justice	efficiency	corporate social responsibility
Topic 10	apartment market	job satisfaction	social capital
	market	customer satisfaction	brand loyalty
	department store	india	brand attitude
	competition	CRM	authenticity

**Table 5:** Results of Frequency Analysis of Year Group Keywords

Raking	2004~2009 (69 papers)		2010~2013 (210 papers)		2014~2018 (625 papers)	
	Keyword	Fre.	Keyword	Fre.	Keyword	Fre.
1	Customer Satisfaction	6	Traditional Market	12	Customer Satisfaction	19
2	Discount Store	4	Customer Satisfaction	8	Job Satisfaction	15
3	Department store	3	Consumer Attitude	5	Purchase Intention	12
4	Business Model	2	Consumption Emotion	5	Satisfaction	12
5	Commitment	2	Purchase Intention	5	Service Quality	12
6	Distribution	2	Repurchase Intention	5	Brand Attitude	10
7	Franchise	2	SSM	5	China	10
8	Market	2	Brand Image	4	Corporate Social Responsibility	10
9	Marketing	2	Franchise	4	Trust	10
10	Merchandising	2	Marketing Strategy	4	Brand Image	9
11	Pharmaceutical Industry	2	Perceived Quality	4	Customer Loyalty	9
12	Relationship Marketing	2	Performance	4	Distribution	9
13	SCM	2	Satisfaction	4	Revealed Comparative Advantage	9
14	Service Justice	2	Service Quality	4	Trade Specialization	9
15	Store Value	2	Small Businesses	4	Traditional Market	9
...	...	...	...	...	...	...
Total Keyword		276		788		2,178

Note) Fre. : Frequency, ( ) : Number of Articles.

In this study, trend was confirmed by applying weights reflecting the whole keywords of the year group for the main keywords of each year group. However, the keywords included in all three years were 'customer satisfaction', and the keywords included two or more were only 'distribution', 'traditional market', 'purchase intention' and 'service quality'. Therefore, the occupancy rate of these keywords was

calculated on the total number of keywords for the year group, and the weighted index by multiplying all keywords. As a result of the analysis, it is confirmed that only 'service quality' is increasing compared to 2010~2013. These results suggest that JDS is evolving into a variety of convergence and integration researches rather than a crystallization of research limited to the distribution in the past.

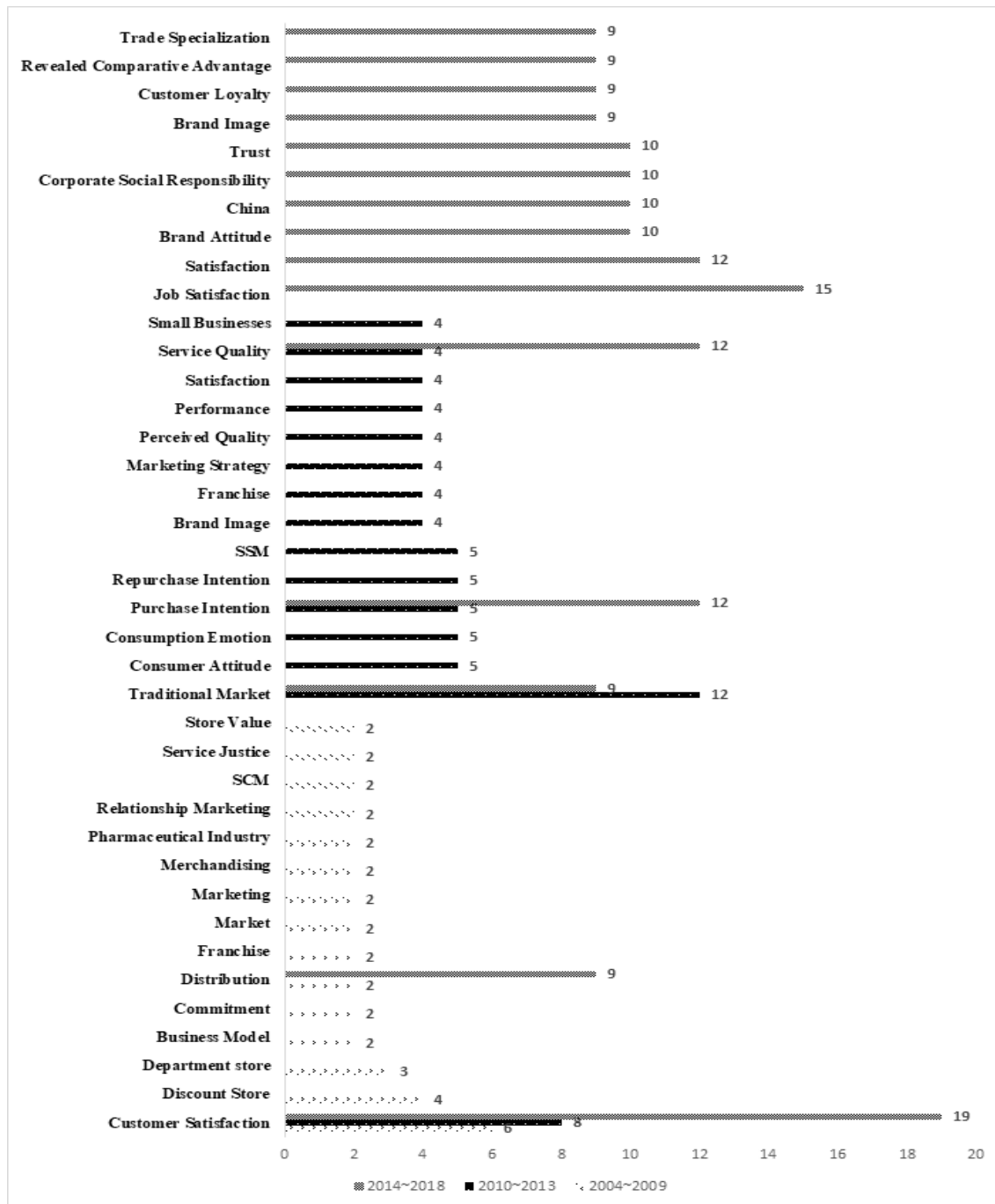


Figure 2: Results of Results of Frequency of Year Group Keywords

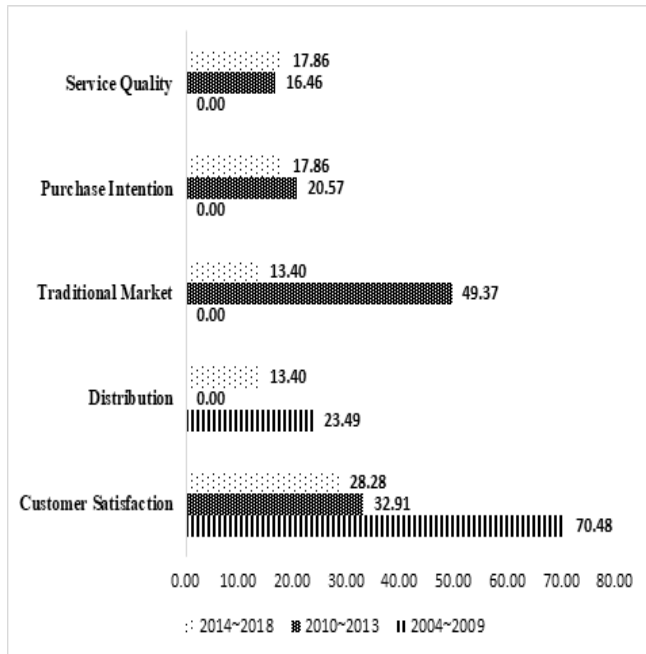


Figure 3: Results of Weighted Keyword Trend Analysis

#### 4. Results

The purpose of this study is not only to explore the direction of the JDS by exploring its research trends, but also to provide the opportunity for related researchers to quote the JDS actively to present better research results.

The analysis results and implications are as follows. First, results of word clouding for 3,242 keywords of the JDS showed that 'customer satisfaction' is the most used keyword, and it was confirmed that it was utilized in order of "traditional market" and "job satisfaction". For example, if there are many reports on customer satisfaction related to off-line distribution agencies (e.g. Kim & Bae, 2005; Koo, 2005; Park, Park, & Lee, 2006) in past studies, it was reported that customers using online retailers such as the Internet, mobile shopping, etc (e.g. Choi & Kim, 2018; Hahn No Reference 2018; Kim & Yoo, 2018) were the reports in recent studies. This result implies that the JDS is changing into researches that are actively responding to recent social issues. Second, results of topic modeling is used to derive the ten topics related to distribution channel, communication, supply chain, brand, business, customer, comparative study, performance, KODISA Journal and trade. Third, the keywords included in all three groups were 'customer satisfaction' as a result of dividing all the keywords into year groups, and it was confirmed that the keywords including two or more are only 'distribution', 'traditional market', 'purchase intention' and 'service quality'. Fourth, 'service quality' was found to be higher than that of 2010 ~ 2013 group as a result of comparing the weighted indices of four

keywords. This result suggests that the researchers' published articles in the JDS is increasing in the field of 'service quality', and that the JDS has developed into various convergence and integration researches from the past studies limited to the field of distribution. However, the identity of JDS is based on distribution. If the diversity of the JDS research topic neglects the study of the distribution field which is classified as the core competence of the value chain, it may expose limitations in positively affecting the development of the distribution industry and presenting the direction. Therefore, the JDS needs to establish and operate an effective journal development strategy such as issuing special editions for specific fields of the distribution industry.

Although this study is the first attempt to provide various insights in attempting keyword analysis on the papers published in JDS, there are some limitations that need to be addressed in future research. First, 'Keyword utilization' of topic modeling which is mainly used in this study is the main limitation. Topic modeling is a statistical technique for analyzing words in the original text to know the subject of the document. Therefore, although this selection is not smooth due to Web crawling in JAMS (Journal & Article Management System), future studies will be more sophisticated if topic modeling using abstracts or entire titles is applied. Second, the number of topics was arbitrarily decided which is also a limitation point of the analysis using keywords, not sentences. The number of topics used in this study was randomly decided because it was analysis using keywords and not sentences. Finally, there are limitations that did not include research trends of other journals such as IJIDB of KODISA because it publishes not only JDS but also various diverse academic journals. Therefore, keyword analysis of JDS alone is likely to be limited. It would be desirable to carry out a research that can reflect the characteristics of the journals and the abstract analysis of the entire KODISA journals.

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