Factors Underlying the Decision to Rent Space at a Shopping Center at Nakhon Ratchasima Province in Thailand: Using Exploratory Factor Analysis

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Abstract

The shopping center business in Thailand is huge. To optimize the occupancy rate, shopping center managers must learn what factors influence shop tenants' decisions to rent space in order to sell their products and services. Thus, the domain of interest of this research study was to explore factors underlying the decision to rent space (DTRS). Based on a survey of existing literature, a few studies have focused on this very important topic. Furthermore, those studies employed only descriptive statistics (e.g. means and standard deviation). However, advanced multivariate statistics (i.e. exploratory factor analysis) could be used advantageously to determine what factors influence the decision to rent. The main objective of this study was to explore factors underlying the decision to rent space of shop tenants using exploratory factor analysis (EFA) in the R Package. Two hundred questionnaires were collected from tenants at a popular shopping center in the north-eastern part of Thailand and analyzed using EFA.

Keywords: *Shopping centers, rental decisions, factors influencing, exploratory factor analysis*

Introduction

As a whole, shopping centers are big businesses in Thailand and probably elsewhere. Of course, their business relies significantly on revenue received from renting space to individual shop tenants. If the occupancy rate of space rental is high, the business would definitely be in good shape. If not, shopping centers might go out of business. The occupancy rate is largely dependent upon shop tenants' decisions to rent or not to rent. If tenants' decision to rent space is positive, it is very likely that they would decide to rent spaces at shopping centers. If not, their decision to rent spaces would probably be quite the opposite. There is evidence that occupancy rates still pose problems at shopping centers in Thailand. According to CRBE Thailand (2016), falling occupancy rates were detected in some of the old or poorly managed shopping centers. Thus, it is important to study how a decision to rent space (DTRS) is made. In order to do this, a specific question needs to be asked: What factors contribute to the decision to rent space (DTRS)? Answering this question was the overall domain of interest for this research study.

What specific problem(s) exist relating to the research topic under scrutiny? There are two major problems. First, based on existing literature, few studies have attempted to analyse the factor structure contributing to the DTRS construct. Secondly, unfortunately these few studies used only descriptive statistics to analyze their data, such as statistical means ($\bar{X}$'s). For example, the work of Maentong and Tochaiwat (2013) basically relied on descriptive statistics (e.g., means) for analyzing what factors were significant to entrepreneurs' decisions to rent space at shopping centers in Thailand. This research study attempts to address these two problems.

Objective

The overall objective of this research was to explore factors underlying shop tenants' decisions to rent space (DTRS) at a shopping center in north-eastern Thailand.

Literature Review

Overview of Shopping Centers in Thailand

In the Thai context, shopping centers and malls refer to the same thing. They represent a large space that has many indoor and outdoor stores (mostly indoor). Customers enter this large space and have access to all these stores. Spaces are rented to tenants (e.g. shop tenants) on the basis of square meters occupied (one meter is equivalent to 10.764 square feet). Table 1 summarizes the number of shopping centers in Thailand by Province (n = 321); the list is probably almost exhaustive. The biggest shopping center, Future Park Rangsit (in Pathum Thani Province), has a total area of 600,000 square meters, with more than 900 shops. But the gross leasable area (GLA) is 295,000 square meters. In addition to regular stores, these shops also include reputable anchor stores (e.g. Central Department Store). The shopping center industry is huge in Thailand.

Table 1. Number of Shopping Centers (Malls) in Thailand by Province (n.d.)

Province	Number	Province	Number
Bangkok	164	Phitsanulok	3
Ayutthaya	2	Phuket	27
Buriram	1	Prachuap Khiri Khan	2
Chiang Mai	29	Rayong	2
Chiang Rai	3	Saraburi	1
Chonburi	16	Songkhla	7
Khon Kaen	6	Suphanburi	1
Lampang	2	Surat Thani	11
Nakhon Pathom	1	Surin	1
Nakhon Ratchasima	7	Trang	5
Nakhon Sri Thammarat	11	Ubon Ratchathani	6
Nonthaburi	4	Udon Thani	7
Pathum Thani	2	**Total**	**321**

Research Variables

Based on existing literature, a number of critical variables were identified for this study. The first is the main determinant, decision to rent space (DTRS). The remaining factors are space (SPAC), price (PRIC), marketing (MARK), and physical environment (PHYS); these variables are defined below.

The decision to rent space (DTRS) refers to a shop tenant's decision to rent (or not to rent) space from a shopping center in order to offer products and services for sale. Hollins (2017) states that people base their decisions on different reasons and factors. DTRS is the main construct of the study. This decision was examined by Maentong and Tochaiwat (2013). They considered space, price, marketing, and physical environment variables as factors influencing the decision to rent space. They found that these variables were significant. Drawing upon their work, this research study hypothesizes that DTRS can be reduced to four principal factors: SPAC, PRIC, MARK, and PHYS.

Space (SPAC) refers to physical shop space (area in square meters) that shop tenants actually rent to operate their businesses. These physical spaces could be rooms, kiosks, and open spaces inside and outside of shopping center compounds. As mentioned, this variable was also included as one of the key variables (under the DTRS) in the study of Maentong and Tochaiwat (2013). Bello (2012) also included this variable as one of the key variables in a study in Nigeria. Hence, in this study, space (SPAC) is hypothesized as a factor under DTRS.

Price (PRIC) refers to the amount of money paid for monthly rent by shop tenants to a shopping center. As mentioned, this variable was also included in the study of Maentong and Tochaiwat (2013) as a key factor to determine the DTRS. Nasir, Jusoh, Ramin, and Yee (2013) also included rental price in their study investigating determinants of tenants' satisfaction. In this study, PRIC is also hypothesized as a factor under DTRS.

Marketing (MARK) refers to marketing activities conducted by shopping centers to attract both tenants and customers. Prothe (cited in Cohen, 2011) stated that marketing encompasses all activities designed to attract and connect customers to the products and services they need. As mentioned, MARK was also included in the study of Maentong and Tochaiwat (2013) as a key variable when attempting to study DTRS. They asked respondents (tenants) about "designated areas for conducting [marketing] activities and sales promotion." In addition, Sujatha and Priya (2015) used MARK, but called it "management support." Under management support, they actually asked their respondents about the "marketing strategy" of shopping centers. MARK also is hypothesized here as a factor under DTRS.

Physical environment (PHYS) refers to all tangible materials used for a particular business. This may extend to the surrounding environments that do not belong to the shopping center. These environmental surroundings refer to what can be seen by people in the shopping center. PHYS is also hypothesized as a factor of DTRS in this research. PHYS was included in the study of Maentong and Tochaiwat (2013). In addition, Kaluzny, Nitsche, and Roller (2011) stated that shopping centers attempt to provide nice environments to attract shoppers. This implies that physical environment is considered to be one of the important factors in the decision to rent space from shopping centers by tenants. In addition, Sujatha and Priya (2015) used the term 'facilities' as a variable in their study of tenant satisfaction in malls in Chennai City, India. This indicates that facility attractiveness has been considered an important variable to shopping center tenants by other researchers. Similarly, MARK is hypothesized as a factor under DTRS in this study.

In summary, four factors were identified from the literature as pertinent to this study. SPAC consisted of seven indicator items, PRIC of five items, MARK of seven items, and PHYS consisted of eight indicator items; all of these were original items. Some items were deleted as the analysis progressed through the exploratory factor analysis (EFA) process to its final stage.

Conceptual Framework

The conceptual framework (Figure 1) illustrates the critical variables considered in this study as contributing to DTRS. In addition, the relationships among these variables are illustrated. DTRS will be further analysed in a future study (second-order confirmatory factor analysis stage). DTRS is called a second-order factor, or higher-order factor. Another name is a hierarchical latent variable (Becker, Klein and Welzels, 2012). In this study, greater emphasis was placed on the bottom four variables, or factors; this was appropriate because EFA was the main statistical analysis.

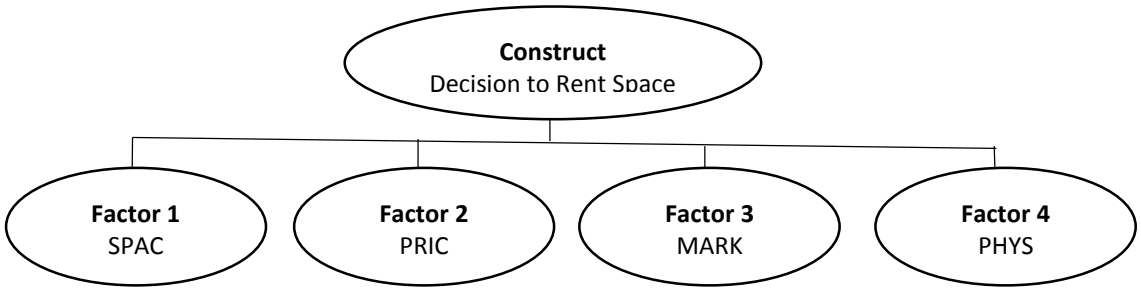

Figure 1. Conceptual Framework: Factors Underlying the DTRS Construct

Methodology

This section describes the research methods used: population, sample, sampling, sample size, instrument, data collection procedures, and proposed statistical analyses. The research is quantitative in nature and relies on both descriptive and inferential statistics.

Population, Sample, Sampling, and Sample Size

Terminal 21 Korat, a shopping center located in north-eastern Thailand that was established in 2015, was the target shopping center. It is a very popular shopping center, listed in the top 40 largest

shopping centers in Thailand. It has six hundred shops (not all leased). If it is assumed that the occupancy rate is seventy percent, the target population of this research study becomes 420 shop tenants. The sample for this research was drawn from the target population using the probability sampling method because the target population was known. Yamane's formula was used (as illustrated below) to calculate the required sample size for this research study. Given the assumed population of 420 shop tenants (sampling frame), the calculated sample size was 191 samples. However, 200 hundred sets of data from shop tenants were collected. Thus, the sample size is beyond the required minimum number.

Yamane's formula was used to determine the sample size for the known population (as cited in Neelum and Khan, 2017): $\mathrm{n} = \frac{\mathrm{N}}{1+\mathrm{N}(\mathrm{e})^2}$

Research Instrument and Pilot Test

A questionnaire (QN) with twenty-seven items was used as the research instrument; three demographic questions were not included in the EFA analysis. It was divided into two major sections: demographic variables, and decision-to-rent-space factors. To ensure validity and reliability, the items were developed based on definitions of key variables in the conceptual framework. In addition, three experts were consulted to improve the questionnaire. These two activities followed the concept of content analysis. In addition, a pilot test was conducted involving 30 questionnaires given to shop tenants at a different shopping center. Reliability calculations (Cronbach's alpha using the R Package) gave the following results: SPAC = 0.872, PRIC = 0.882, MARK = 0.891, PHYS = 0.882. Values were above 0.70 for all items of the four hypothesized factors. According to Nunally (as cited in Hee, 2014), an alpha of 0.70 or above is considered acceptable for reliability of scale items. Thus, the instrument was considered valid and reliable.

Data Collection Procedure

Questionnaires were distributed to 200 shop tenants at Terminal 21 Korat Shopping Center in person during shopping center hours. Basically 200 shop numbers were drawn from the sampling frame consisting of 480 shop numbers, excluding unrented shops. Respondents completed the questionnaires themselves, with minimal or no help from the researcher. After respondents completed the questionnaire, any omissions were checked. If any were detected, a respondent would be asked to rectify them.

Statistical Analysis

For the demographic section, frequency and percent data were employed. For exploratory factor analysis, the analysis begins with correlation. Then, the Kaiser-Meyer-Olkin (KMO) test, Barlett's test of the sphericity, and other statistical tests required for EFA were carried out. The R Package, along with its required add-on packages, was used to carry out all required statistical analyses mentioned in this section. The R Package is an open-sourced software tool used worldwide. For this research, it served as the main analytical package. There are over 10,000 (add-on) packages available from developers around the world to support the R Package. This study used the R Package as the main tool – along with other add-on packages – to analyse the sample data.

Analysis and Results

There are several steps required for conducting exploratory factor analysis (EFA) using the R package. First, correlation among critical variables (Q 1.1 to Q 4.8) must be measured. Second, the Kaiser-Meyer-Olkin (KMO) test and Barlett's Test of Sphericity are recommended. Third, the Very Simple Structure (VSS) tool can be used to determine the number of factors that should be retained, based on a given sample data. Fourth, parallel analysis is probably the main tool to determine the number of factors that should be retained. Fifth, extraction and rotation methods are required to obtain factor loadings for the retained factors. Finally, the factors retained and their respective indicators are presented in diagrammatic form (automatically produced by R Package).

Demographic Profile of Respondents

Table 2 provides the demographic profile of respondents. Intentionally, the demographic profile section only highlights three items: gender, age, and education. The total number of respondents was two hundred. Among the respondents, there were more females (70.0%) than males. The top three age groups included those 21-30 years old (58.5%), 31-40 years old (29.0%), and 41-50 years old (7.5%). Finally, the top three education groups included undergraduate or equivalent (58.0%), senior high school (36.5%), and junior high school or below (3.5%).

Table 2. Demographic Profile of Respondents

Demographic Profile	Frequency	Percentage (%)
Gender		
Male	60	30.0
Female	140	70.0
Total	200	
Age (in years)		
< 21	8	4.0
21 – 30	117	58.5
31 – 40	58	29.0
41 – 50	15	7.5
> 50	2	1.0
Total	200	100
Education		
Junior high school or below	7	3.5
Senior high school	73	36.5
Undergraduate or equivalent	116	58.0
Above undergraduate	4	2.0
Total	200	100

Correlation Matrix

The next stage in EFA is to develop a correlation matrix.

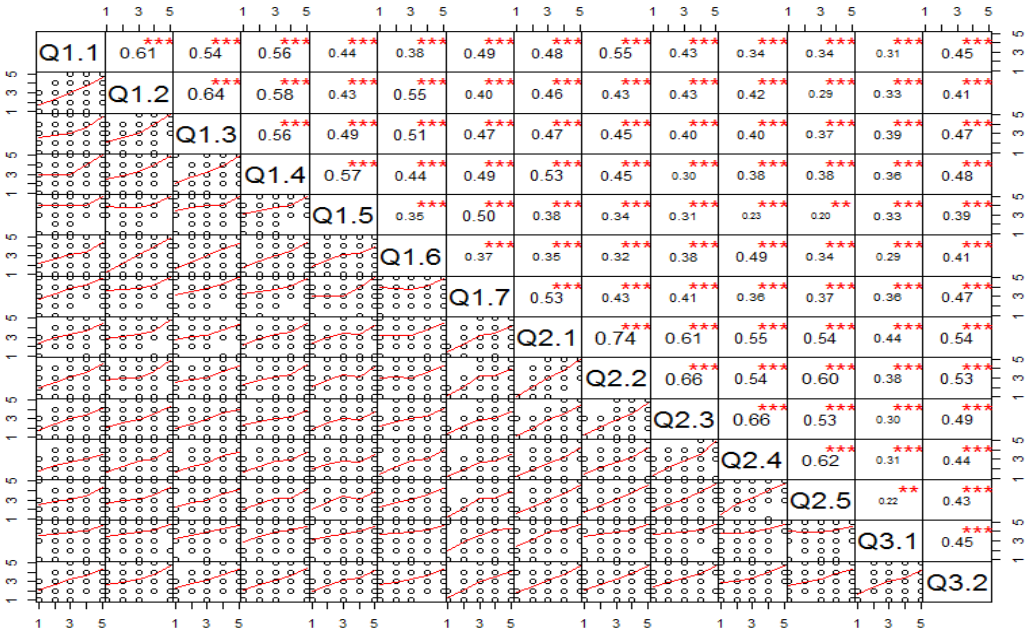

Figure 2. Abridged Correlation Maxtrix among Variables (Question Items)

It is important to create a correlation matrix at an early stage of EFA. A correlation matrix could be simply defined as correlations among variables (items) of the study. According to Allen, Tisworth, and Hunt (2009), variables must be correlated to some extent to justify the use of EFA. They further recommend that correlations among variables should be at least 0.30.

The original correlation matrix was too large due to a large number of variables (items). Thus, an abridged correlation matrix is presented above (Figure 2). In short, twenty-seven variables are significantly correlated. However, two items were deleted: Q 4.2 and Q 4.6, because they are not related with most other items. This left twenty-five items.

Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity

The Kaiser-Meyer-Olkin (KMO) test is to check the sample's adequacy for factor analysis. According to Williams, Onsman, and Brown (2010), if KMO ranges closer to 1 (0 being the lowest), it implies that the pattern correlations are compact. Given that the computed KMO value was 0.91, it could be concluded that the pattern correlations are adequately compact. Therefore, the sample data for this research is suitable for EFA.

The null hypothesis for Bartlett's Test of Sphericity proposes that variables are not correlated. The results obtained here led to the rejection of the hypothesis based on a Chi-square (χ^2) value of 1254.17 (df = 10, p-value (0.000) < 0.001). This implies that sample data was adequately correlated. This means the data are suitable for EFA, meaning that the questionnaire items are factorable. In short, both the KMO test and Bartlett's Test of Sphericity indicated that EFA is appropriate. Thus, the analysis could realistically proceed to the next EFA stages.

Very Simple Structure Analysis (VSS)

Very simple structure (VSS) analysis is a function available on the psychology package (Revelle, 2017). The purpose of this analysis is to determine the number of factors that might be extracted. Based on Figure 3, the number factors that should be extracted was four. This solution will be compared against a parallel analysis in the next section.

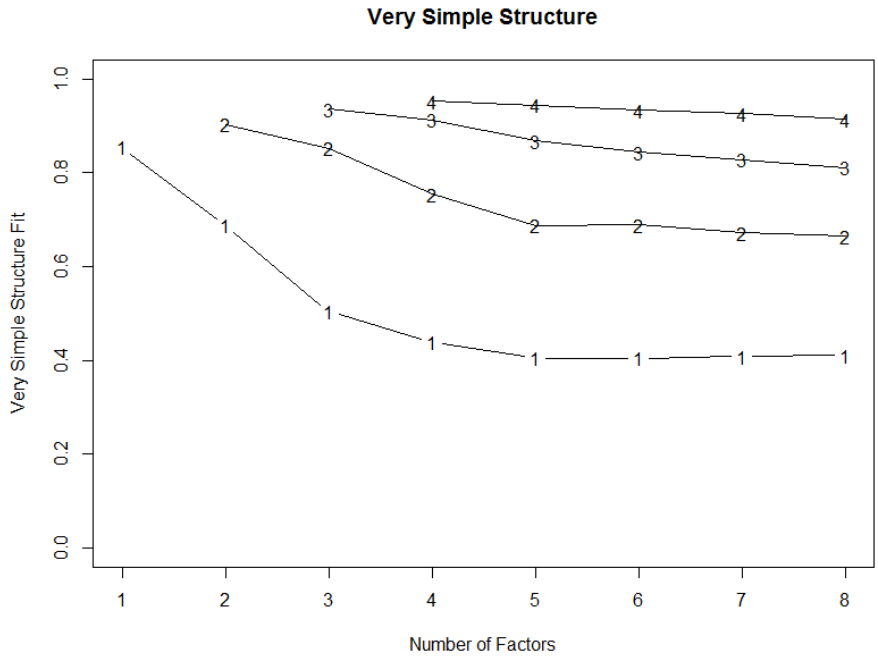

Figure 3. Number of Factors to Be Extracted, Recommended by VSS

Parallel Analysis Scree Plot

A parallel analysis scree plot is available in the R package. It produces three critical lines according to the legend of Figure 4: FA Actual Data, FA Simulated Data, and FA Resampled Data.

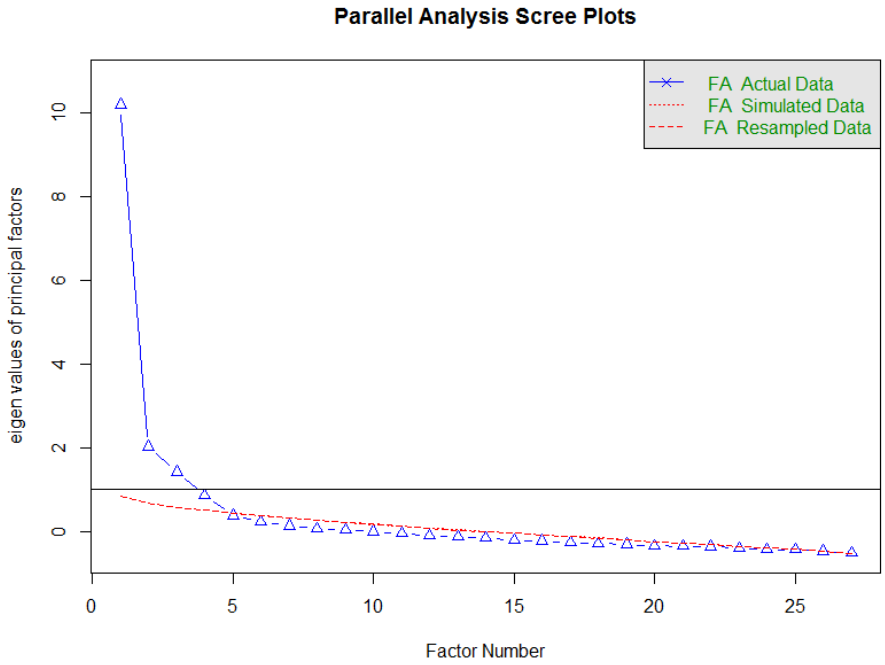

Figure 4. Scree Plot and Parallel Analysis

The way to interpret Figure 4 is to count the number of small triangles from top to bottom before the FA actual data and FA simulated data lines are reached. Based on Figure 4, four small triangles could be counted before reaching the simulated and resampled lines. Thus, it could be concluded that the parallel analysis scree plots has extracted four factors. This is consistent with the analysis that was conducted by VSS above.

Extraction and Rotation

The extraction method used was Ordinary Least Squared, an extraction method in the R Package. The rotation method used was Oblimin, a default rotation method for the R Package.

Factors Underlying the Decision to Rent Space (DTRS)

Figure 5 and Table 3 (please see following pages) summarize factors extracted and retained, along with factor indicators. Figure 5 has four important components. From left to right, the first component notations (Q 1.1 to Q 4.8) includes indicators of the four individual factors. The second component includes factor loadings for all four factors, and the third component includes factors. Finally, the fourth component includes correlations among factors. The correlations among the factors are adequately correlated (all above 0.30).

Table 3 summarizes the factor loadings and the variance percentages of individual factors contributing to the EFA model. Finally, SS or Sum Squared loadings (eigenvalues in other packages) are also included.

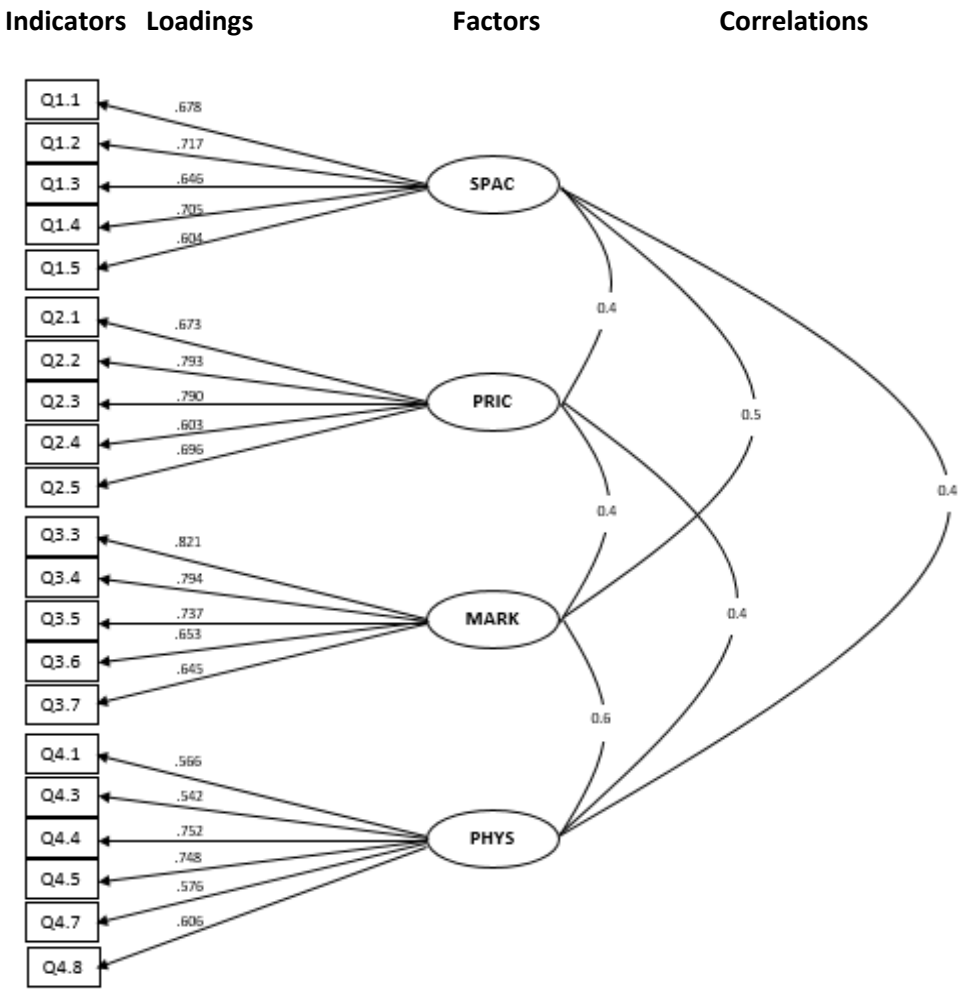

Figure 5. Factors and Indicators Underlying the DTRS Construct

Discussion

As stated at the paper's introduction, two problems were identified. First, few studies have investigated factors underlying decisions to rent shop space (construct). Secondly, these few studies employed descriptive statistics to analyse the data. This research began by proposing a conceptual model based upon the existing literature. Based on this model, a questionnaire was developed. To ensure the quality of the questionnaire, it went through recognized development procedures. This research proposed that there are four factors underlying rental decisions: SPAC, PRIC, MARK, and PHYS. These four factors are latent variables. This study used exploratory factor analysis available in the R Package to explore factors underlying the DTRS construct and identified their respective indicators. Four basic factors were identified, along with their appropriate indicators.

Table 3. Indicators, Factors, Factor Loadings, Percent of Variance, SS Loadings

Indicators	Factors			
	(1) SPAC	(2) PRIC	(3) MARK	(4) PHYS
Q 1.1	.678			
Q 1.2	.717			
Q 1.3	.646			
Q 1.4	.705			
Q 1.5	.604			

Table 3. Indicators, Factors, Factor Loadings, Percent of Variance, SS Loadings (Cont.)

Indicators	Factors			
	(1) SPAC	(2) PRIC	(3) MARK	(4) PHYS
Q 2.1		.673		
Q 2.2		.793		
Q 2.3		.790		
Q 2.4		.603		
Q 2.5		.696		
Q 3.3			.821	
Q 3.4			.794	
Q 3.5			.737	
Q 3.6			.653	
Q 3.7			.645	
Q 4.1				.566
Q 4.3				.542
Q 4.4				.752
Q 4.5				.748
Q 4.7				.576
Q 4.8				.606
Percent of Variance	11.100	11.200	13.400	11.800
SS Loadings	2.787	2.801	3.350	2.941

A correlation matrix was developed to ensure that variables (indicators) were adequately correlated. The KMO test and Bartlett's Test of Sphericity were carried out to see whether EFA was suitable, and this was confirmed. The number of factors to be retained was assessed through the VSS function in R Package, and four factors were selected by the VSS function. A similar result was obtained by applying the parallel analysis scree plot available in the R Package. Hence, four factors along with their indicators were retained. Thus, the two major problems identified at the introduction were resolved.

Conclusions

The purpose of this research study was to explore the factors underlying the decision to rent space (DTRS), and this objective was achieved. Four factors (SPAC, PRIC, MARK, and PHYS) were identified along with their respective indicators. In terms of theoretical contributions, this research adds to a body of literature on the topic under study. In terms of practical contributions, this study helps the management of shopping centers to gain insights into the critical factors underlying decisions to rent. Thus, it is strongly recommended that they pay attention to the critical factors (SPACE, PRIC, MARK, and PHYS) because these play a significant role in shop tenants' decisions to rent space. Of course, the decision to rent space is obviously related to shopping centers' occupancy rate. In terms of pedagogy, this paper also contributes to a growing body of literature on the use of the R Package. In terms of further research, it is recommended that second-order confirmatory factor analysis (CFA) be carried out to ensure the robustness of the model discovered in this study.

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