

Issues Involved in Maintaining an Effective Supply Chain in the Real Estate Industry of Bangladesh

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Being an important sector of Bangladesh Real estate industry is going through intensified competition among the market players with the mixture of favorable issues and unfavorable challenges. To cope with such situation, an integrated system of supply chain management has become a necessity for the balanced growth and development of the REI of Bangladesh. Though the earlier research studies found a very significant role of maintaining effective supply chain for the growth of the REI, many of these studies focused only on one or few of the dimensions of the subject matter. To fill out such knowledge gap left out by the previous studies, the present study aims to examine the issues which can ensure effective supply chain management for the real estate industry of Bangladesh. The current study is the result of primary and secondary data collection and their analysis which indicate a good number of facilitating issues or factors including integrated linkage of backward and forward suppliers, outsourcing or sub-contracting for cost effectiveness, land for development, high quality and eco-friendly building materials and products, utilities, renewable energies and the likes.

Field of Study: Supply Chain Management

Keywords: Supply chain, real estate industry (REI), backward, forward and horizontal linkage

1. Introduction

Supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer" (Martin, 1992, p. 320). While supply chain Management exists to overcome the lack between different partners within a supply chain until the last costumer (Water, 2011, p. 39-40,). Hence, supply chain is considered as an important source of improved performance for the construction industry (London & Kenley 2001). Real estate industry is also not an exception to this. It is worthy to mention that the real estate is a growing industry of Bangladesh as the result of population explosion, growth of high and upper middle-income segments, urbanization, migration from rural to urban and city areas for occupational engagement, corporatization, etc. As a result, investment in the construction, renting or purchase of apartments, part or complete building, developed, under-development and undeveloped land, etc., is/are considered as a vital decision to fulfill the requirements of individual's household or family habitation as well as housing facilities for corporate employees or buyers. With a series of success and fraudulent cases from the registered and unregistered real estate companies in this industry, the buyers have become more

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conscious in course of time in making investment of their valued money. This has intensified competition among the market players with the mixture of favorable issues and unfavorable challenges. To cope with such situation, an integrated system of supply chain management has become a necessity for the balanced growth and development of the REI of Bangladesh.

The earlier research studies found a very significant role of the concerned stakeholders of backward, forward and horizontal linkage in maintaining effective supply chain for the growth of the REI in many countries. However, many of these studies focused only on one or few of the dimensions of the subject matter. Moreover, there were also only a very few studies available from Bangladesh context. So, it is clearly evident that there is a **research gap** and to mitigate this gap a rigorous research is yet to be systematically attempted. To fill out such knowledge gap left out by the previous studies, the present study investigates the **research question**: “Is there any issue which can ensure effective supply chain management for the real estate industry of Bangladesh?” This research question has put forward and one **hypothesis** has been developed which is ‘There are some issues which can ensure effective supply chain management for the real estate industry of Bangladesh’. From the light of the above hypothesis, the principal **objective** of this study is to examine the issues which can ensure effective supply chain management for the real estate industry of Bangladesh.

Prevailing challenges and opportunities in the potential real estate industry acted as **motivation** to pursue this study.

This paper is organized with the various sections. Section 1 deals with introduction, Section 2 focuses on the background of the real estate industry of Bangladesh, Section 3 portrays the literature review, Section 4 goes with the conceptual model of the present study, Section 5 highlights the methodology of the study, Section 6 exhibits the analysis and findings of the study and Section 7 draws a constructive conclusion with implications.

2. Background of the Real Estate Industry of Bangladesh

Real estate development is a business activity concerned with land and construction that provides value-adding services by developing residential, commercial, institutional, industrial and integrated projects and related infrastructure (Seraj, 2016). The higher rate of urbanization together with high pace of population growth and density especially in the urban areas have put pressure to increase supply of real estate products such as flat rather than lands. Increased demand coupled with the continuous failure of public sector to meet the basic need encouraged private investors to invest in the sectors followed by the growing real estate sector. After a haphazard start, it has gradually become more systematic and organized with the formation of Real Estate and Housing Association of Bangladesh (REHAB) as the spokesperson of the sector in 1991. Thus, real estate has emerged as a crucial industry of Bangladesh over the years. Being integrated with the allied industries, for example steel, cement, tiles and sanitary ware, cable and electric wire, paint, glass and aluminum, brick, building materials, and consumer durables, this very industry of the country is growing phenomenally in fulfilling the rising demand of urban people.

Since the boom in 1996 the real estate sector did not lose the pace of growth significantly (Hossain, 2000). However, the recession resulted in a huge supply in the real estate market in 2004-06. After then when people resumed investing in the real estate, the sector experienced a boom again during 2009-11 but did not last long. Since 2013, Bangladesh has been experiencing a decline a real estate investment by individual buyers, and the sector has not seen any hopeful signs of recovery as yet.

Though the sector offered abnormal profits in the initial phase, profits has been decreased in course of times mainly because of the introduction of large scale competition in the market, lack of social security and Real Estate Act, land scarcity, increased population, hazards in lands' purchase, construction and management of construction related stakeholders, public sector failure, increased costs of raw materials, higher bank interest rate for real estate loans, high total purchase price, customers' complaint on frauds, etc. are the major reasons for the slow growth of the real estate sector in Bangladesh (Islam and Arefin, 2009). After some reforms and change in trends in the last decade, some factors again influenced the development of real estate sector in Bangladesh which include income pattern change, change in family structure from the past extended or joint families to the nuclear families, hazards related to lands, lack of social security, price increase of lands, scarcity of lands, capitalist mood of economy, luxury life, land owners' problem in financing, rapid population growth, rapid urbanization and migration, decrease in bank interest rate (Islam and Arefin, 2009).

Even though so many limitations the real estate still seems to be an attractive and potential industry in Bangladesh. According to a survey titled "Survey on Occupied Residential Houses and Real Estate Services 2018" conducted by the Bangladesh Bureau of Statistics (BBS), the real estate and housing sector contributes 7.8 percent or Tk. 1.415 trillion of the country's gross domestic product (GDP) (The Financial Express, 2019).

3. Literature Review

In absence of an effective supply chain, business suffers from various types of risks and thereby struggle for sustainability. Such risk on the supply chain consists in every factor that might affect the planned flow of material (Waters, 2011). Waters (2011) points out such risks as: new regulations, currency exchange and inflation, traffic accident, equipment failure, demand fluctuation, competition, theft and fraud, human errors and labor accidents.

For an effective supply chain management, Waters (2011) advocates to ensure i) integration of supply chains, ii) cost reduction, iii) agile logistics for flexible and quickly responsive activities to changing conditions, iv) e-business, v) globalization to expand the supply chain to spread longer and in different continents, vi) outsourcing those activities which create complexities in the implementation of core functions, vii) increasing environmental concerns, etc. In this regard, 11 best practices can be combined from the findings of different research studies to make possible the increase of resiliency by increasing the resistance against disruptions recovering the operational capability as soon as possible. The list of best practices include 1. Quality, 2. Contingency Plans, 3. Increase of Stock Level, 4. Add Spare capacity, 5.

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Increase Collaboration and Visibility, 6. Agility on Operations, 7. Vendor Rating, 8. Increase Forecast and planning, Quality 9. Dual or multiple Source Strategy, 10. Insurance and 11. Rationalize Product Range (Dittmann, 2014; Waters, 2011).

Dainty et al. (2001) observe the need to facilitate inter-firm relationships, achieve mutual benefits and build trust at key interfaces in the supply chain (client or contractor, consultant or contractor, contractor or subcontractors, subcontractor or suppliers, etc.).

Vrijhoef and Koskela (2000) recommend an integrated management of the interface between site activities and supply chain. In another study, Vrijhoef and de Ridder (2005) recommend two strategies for integration; supplier driven integration and client driven integration.

In the supplier driven integration, the great part is approximately 75 percent and more of the projects value is built with help from suppliers and subcontractors (Dubois and Gadde, 2000) while in the client driven integration, the professional client acts as system integrators in the supply chain (London and Kenley, 2000).

Since the design specification process is mainly based on client requirements, norms and standards, the concept-to-order and design-to-order are reflecting the two main contractual forms between the client and the construction company; design-build and design-bid-build respectively (Winch, 2003). Briscoe et al. (2004) identified the client as the most significant actor in achieving integration in the supply chain.

Management of supply chain relationships in the construction projects like those of real estate is, however, especially problematic due to the discontinuity of demand for projects, the uniqueness of each project in technical, financial, and socio-political terms, and the complexity of each project in terms of the number of actors involved (Skaates et al., 2002). However, a more flexible and configurable building system consisting of configurable modules with all equipment, fittings, wallpaper and flooring attached to the elements before assembly on-site may get closed down due to high development cost and poor return on investment (Andersson et al., 2009). One possible solution for the real estate industry players or builders is to offer generous framework agreements with big clients from which the client can call-off apartments when needed (Andersson et al., 2009).

The process of supply chain in the construction industry such as real estate sector includes materials supplies, construction facilities and services to customers where each process is connected (Towill, (1996).

Albaloushi and Skitmore (2014) exhibit the factors affecting the implementation of supply chain management in this industry are a) Customer needs approaches, b) Supply chain technical background, and c) following company procedures in dealing with supply chain management.

Vrijhoef, R. and Koskela, L. (2000) find four roles of supply chain management in construction help clients, contractors, material and component suppliers; which are i) to ensure dependable material and labor flows to the site to avoid disruption to the workflow, to reduce costs and duration of site activities by simply focusing on the relationship between the site and direct suppliers i.e., co-operation between

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suppliers and contractors; ii) to improve supply chain with efficient logistics or transportation, lead-time and inventory management through prefabricated concrete elements to reduce costs; iii) to transfer technical activities from the site to off-site to avoid the basically inferior conditions on site, or to achieve wider concurrency between activities to reduce the total costs and duration; iv) to ensure integrated management and improvement of the supply chain and the construction site through open building by separating the infill from the structure to reconfigure the space as per change in their needs and sequential procedure.

The real estate industry of Bangladesh is also going through similar experiences as those found in the aforementioned research studies. Some of such issues involved in maintaining an effective supply chain in the real estate industry of Bangladesh may be understood from the following:

For huge demand and inadequacy of land, price of land is very high in the urban area according to the real estate participants (Barua, et al, 2010). Cities in Bangladesh are expanding vertically to meet the problems of urban population explosion, scarcity of land and spiraling land price (Bony and Rahman, 2014). Due to scarcity of land and parallelly increase in housing demand has escalated the land price to an unaffordable range (Forests, 2016). The studies by Nabi et al. (2004) and Barua et al. (2010) also exhibit scarcity, speculation and increasing demand as the major reasons of the 20 to 50 times increase of the price of land in the city since 1980s. In their studies, Islam & Adri (2008) and Khan (2012) exhibit both vertical and horizontal direction trend of real estate development in the city areas in order to cope with overpopulation, scarcity of land and spiraling land prices. According to Khan (2012), due to rapid growth of city population, inadequate land for housing and high price of land, housing problems became acute which constitute 46%, 33% and 21% respectively. The spiraling land prices that accompany high-rise buildings drive away the low income group and therefore, add to the acute slum conditions that are already prevailing in cities (Khan, 2012).

Bangladesh real estate market is growing rapidly because of increasing land price, construction cost, awareness of apartment living and western influences (Kalam and Pandurengan, 2016). According to the President of Dhaka Chamber of Commerce and Industries, rise in prices of land and constructions materials is a great problem in the way of development of the country's real estate sector (Dhaka Tribune, 2019).

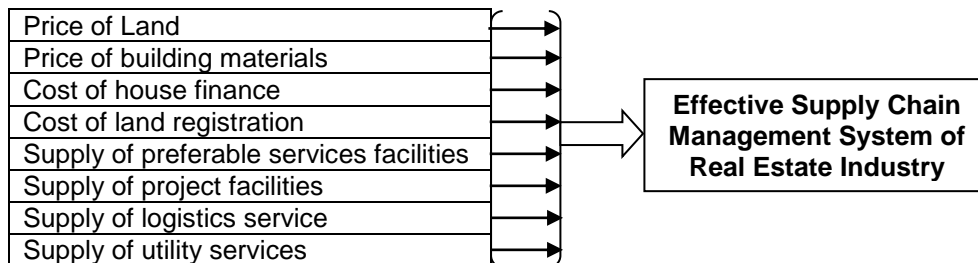
In a number of research studies, high price of land, high cost of land registration, high price of building materials, etc., have been found with long lasting impact on the supply chain of the real estate industry (Bony and Rahman, 2014; Dewri et al, 2012; Islam, 2008; Khaled et al. 2012; Khan and Barua, 2009; Labib, et al., 2013).

In case of apartment building supply chain the issues like security, fittings, interior design, sufficient ventilation, location, preferable services facilities (timely handover, quality maintaining, after sales service), good communication (transportation hub), project facilities (parking, community hall room, generator, lobby, external staircase, lift, front attractiveness and quality, warehouse), home finance (price, credits, installment payments, bank loan), etc., have immense impact on the supply chain of the real estate industry (Barua, et al. 2010; Dewri, et al., 2012; Islam and Hossain, 2008); Islam, 2012; Khaled, et al, 2012). The other studies found the issues such as

physical quality (cracks, kitchen, lighting, electronic lighting and window to outside) (Khaled et al. (2012); utilities like water [plumbing facilities, water quality and water pressure, drainage, commode, internal architecture) (Dewri et al., 2012) (Khaled et al., 2012), as influencing factors on the effectiveness of the supply chain of the REI.

4. Conceptual Model of the Present Study

Figure 1: Research Model for Effective Supply Chain Management System of the Real Estate Industry of Bangladesh



From the light of the extensive literature review the above Figure 1 has been developed for the present study to exhibit the analytical (i.e., graphical) model of the issues which can ensure effective supply chain management for the real estate industry of Bangladesh.

5. Methodology of the Study

From the literature review 8 factors of effective supply chain have been identified as variables which are exhibited in the **Table 1** from v1 to v8.

Table 1: Identification of Variables

Code	Variables	Sources
v1	Price of Land	Barua et al., 2010; Bony and Rahman, 2014; Dewri et al, 2012; Dhaka Tribune, 2019; Forests, 2016; Islam, 2008; Islam & Adri, 2008; Kalam and Pandurengan, 2016; Khaled et al. 2012; Khan, 2012; Khan and Barua, 2009; Nabi et al., 2004; Labib, et al., 2013
v2	Price of building materials	Bony and Rahman, 2014; Dewri et al, 2012; Dhaka Tribune, 2019; Islam, 2008; Kalam and Pandurengan, 2016; Khaled et al. 2012; Khan and Barua, 2009; Labib, et al., 2013
v3	Cost of house finance	Barua, et al. 2010; Dewri, et al., 2012; Islam and Hossain, 2008; Islam, 2012; Khaled, et al, 2012
v4	Cost of land registration	Bony and Rahman, 2014; Dewri et al, 2012; Islam, 2008; Khaled et al. 2012; Khan and Barua, 2009; Labib, et al., 2013
v5	Supply of preferable services facilities	Barua, et al. 2010; Dewri, et al., 2012; Islam and Hossain, 2008; Islam, 2012; Khaled, et al, 2012
v6	Supply of project facilities	Barua, et al. 2010; Dewri, et al., 2012; Islam and Hossain, 2008; Islam, 2012; Khaled, et al, 2012; Khaled et al., 2012
v7	Supply of logistics service	Barua, et al. 2010; Dewri, et al., 2012; Islam and Hossain, 2008; Islam, 2012; Khaled, et al, 2012
v8	Supply of utility services	Dewri et al., 2012
DV	Effective Supply Chain Management System of Real Estate Industry	

Source: Literature Survey

To examine the set research objective, the present study has been endeavored through the collection of both primary and secondary data. The secondary data have been collected from the referred journals, newspapers, etc., in the respective field. While primary data have been collected from the 150 respondents including the officials, laborers, current and prospective customers, suppliers of building material, logistic support, outsourcing, transport service providers, carpenters, officials of the financial institutions and utility companies mostly in Dhaka, Chittagong and Cumilla cities. In this regard, random sampling method has been followed to undertake an extensive survey on the respondents through a structured and self-administered questionnaire comprising of open-ended and non-forced, balanced and odd numbered non-comparative itemized questions using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Inferential statistical tools have been used for primary data analysis.

6. Analysis and Findings

6.1 Reliability Analysis

In **Table 2**, all the variables (8 independent variables and 1 dependent variable) studied in the current paper altogether exhibit alpha value of .779 which is greater than 0.6, a value between 6.0 to 7.0 recommended as acceptable (Cooper and Schindler, 2006; Malhotra and Birks, 2007). This justifies the reliability of the study.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
.779	9

6.2 Sampling Adequacy

Kaiser (1974) recommends accepting values greater than 0.5 as acceptable as proof of sampling adequacy. Kaiser provided a range in which values less than 0.50 are considered as “probably won't be very useful”, values between 0.5 and 0.7 are “mediocre”, values between 0.7 and 0.8 are “good”, values between 0.8 and 0.9 are “great” and values above 0.9 are “superb. **Table 3** exhibits that the value of Kaiser-Meyer-Olkin (KMO) Measure is .708 which is ‘good’ suggesting the adequacy of the sample size for the factor analysis. From the results of the Bartlett’s Test of Sphericity it is seen that the approximate chi-square statistics is 323.890 with 28 degrees of freedom, which is greater than the table value. So, the result of Bartlett’s test of sphericity is significant.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.708
Approx. Chi-Square	323.890
Bartlett's Test of Sphericity	df
	28
	Sig.
	.000

So, by incorporating unique variables from the respective studies the current paper has gained a unique proposition which justifies the credibility of the proposed model.

6.3 Multiple Regression Analysis

The following **Table 4a, 4b and 4c** exhibit the results of the regression analysis. To predict the goodness-of-fit of the regression model, the Multiple Correlation Coefficient (R), Coefficient of Determination or, Square Multiple Correlation Coefficients (R^2), Adjusted R^2 , F ratio and t-values with significance have been examined.

Table 4a: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.757 ^a	.573	.549	.50112

a. Predictors: (Constant), v8, v6, v5, v2, v4, v1, v7, v3

In the **Table 4a:**

Firstly, the multiple correlation coefficients (R) of 8 independent variables (v1 to v8) on the dependent variable (Effective Supply Chain Management System of Real Estate Industry i.e., DV) is 0.757, which shows that Supply Chain Management System of Real Estate Industry has positive input from the 08 independent variables. In other words, the R value 0.757 shows 75.7% multiple correlation coefficients which means that there is 75.7% correlation between the predictors or 08 independent variables and the dependent variable (Effective Supply Chain Management System of Real Estate Industry i.e., DV).

Secondly, the Square multiple correlation coefficients (R^2) is 0.573, suggesting that more than 57.3% of the variation or variance in the dependent variable (DV) has been explained by the 8 predictors or independent variables. This meets the assumption of non-zero variance based on the fact that the R^2 value the variance in the predictor values, which in this case is not equal to zero.

Thirdly, the adjusted R^2 value 0.549 is ideal to generalize the model well because this value is close to R^2 value with a small difference of 0.024 (0.573 – 0.549). This means that if the model were applied to the population, it would account for 2.4% less variance in outcome.

Table 4b: ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.552	8	5.944	23.670	.000 ^b
	Residual	35.408	141	.251		
	Total	82.960	149			

a. Dependent Variable: DV

b. Predictors: (Constant), v8, v6, v5, v2, v4, v1, v7, v3

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In **Table 4b**, firstly, the F ratio is 23.670, which is highly significant and this means that the model significantly improves the ability to predict the outcome variable. In this table, the p value is shown as 0.000 which is less than 0.05 indicating the model has a significant fit to the overall data.

So, the regression model achieved a satisfactory level of goodness-of-fit in predicting the variance of DV in relation to the 8 predictors or independent variables, as measured by the above mentioned R , R^2 , Adjusted R^2 and F ratio. In other words, at least one of the 8 predictors or independent variables is important in contributing maintaining effective supply chain management system of real estate industry in Bangladesh.

Table 4c: Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.745	.233		7.494	.000
1 v1	.000	.061	.000	.005	.996
v2	.010	.059	.012	.175	.862
v3	.012	.064	.014	.182	.856
v4	.073	.045	.108	1.615	.108
v5	.001	.040	.001	.015	.988
v6	-.061	.047	-.085	-1.297	.197
v7	-.031	.060	-.039	-.514	.608
v8	.552	.053	.726	10.321	.000

a. Dependent Variable: DV

In **Table 4c** the application of the b-values in the multiple regression model equation interprets this model to mean that for every increase of one unit in v1, assuming the effects of v2, v3, v4, v5, v6, v7 and v8 be held constant, effectiveness of the supply chain management system of real estate industry in Bangladesh would positively increase. Likewise, should the effects of other components be held constant, a single unit increase in v2 would result in a 0.10 increase in the supply chain management system of real estate industry in Bangladesh. Similarly, being other components held constant a single unit increase in v3, v4, v5, v6, v7 and v8, would lead to a .012, .073, .001, -.061, -.031 and .552 increase respectively in the effectiveness of the supply chain management system of real estate industry in Bangladesh.

Since the beta values are the standardized versions of the b-values and are directly comparable, these values may be used to infer regarding the relative importance of each predictor or independent variables to the model. In other words, the beta coefficients could be used to explain the relative importance of the 8 dimensions (independent variables) in contributing to the variance in the effectiveness of the supply chain management system of real estate industry in Bangladesh (DV i.e., dependent variable). As far as the relative importance of the 8 dimensions is concerned, v8: (Beta=0.726) followed by v4: (Beta=0.108), v3: (Beta=0.014), v2: (Beta=0.012), v5: (Beta=0.001), v1: (Beta=0.000), v7: (Beta= -0.039) and v6: (Beta=-0.085), are all important in the effectiveness of the supply chain management system of real estate industry in Bangladesh.

Again, since there are more than one predictors (independent variables), the magnitude of the t-value in conjunction with the significance has been considered to assess the overall contribution to the model. Based on the decision rule “the smaller the significance value and the greater the t-value, the greater the contribution of the predictor”, it is seen that v8: (t=10.321) followed by v4: (t=1.615), v3: (t=0.182), v2: (t=0.175), v5: (t=0.015), v1: (t=0.005), v7: (t= -0.514) and v6: (t= -1.297), are all significant predictors or independent variables of the effectiveness of the supply chain management system of real estate industry in Bangladesh. In this regard, from the t-values it can be also concluded that v8 has a greater impact on the outcome (i.e. DV) than v4, v3, v2, v5, v1, v7 and v6.

In summary, it can be stated that all underlying dimensions are positive and therefore are significant. Thus, the result of multiple regression analysis accepts the alternative hypothesis (H_a) that “There are some issues which can ensure effective supply chain management for the real estate industry of Bangladesh”. So, there is a relationship as expected.

7. Conclusion and Implications

The contribution of this paper is the statistically proven model which exhibit the active role of eight issues or factors that may ensure effective supply chain management system for the real estate industry of Bangladesh through affordable cost of land, building materials, land or apartment registration, house finance, utility and other necessary support from the respective service providers or suppliers.

The present paper is found very significant and unique for its compliance with the reliability, sampling adequacy, chi-square test, ANOVA, F test and t test criterion. Results indicate a good number of facilitating issues or factors which have significant impact on the effective supply chain management for the real estate industry of Bangladesh. Among them integrated linkage of backward and forward industries (like ceramic, aluminum, decorative via paint, furniture, etc., cement, etc.) outsourcing or sub-contracting for cost effectiveness, optimal sourcing and allocating land for development, selection of the suppliers and service providers for high quality, building materials and products, utilities and the likes may positively influence the concerned stakeholders and thus ensure effective supply chain management for the real estate industry of Bangladesh with increased satisfaction of real estate developers, their suppliers, service providers, employees and customers and thereby increase greater business volume and growth.

However, the study could not avoid some limitations because the majority of contributions involving supply chain relationships in management and marketing literature deal with continuous exchanges in long-term buyer-supplier relationships (Claycomb and Frankwick, 2010). Hence, there is a lack of research on discontinuous exchanges in project-based industries, such as the construction industry (Crespin-Mazet and Ghauri, 2007). Also, the recent development of modular building system opens new research opportunities in the application of supply chain modularity in construction (Voordijk et al., 2006). From this perspective, this paper is fit as input for future research endeavors as it not only focuses on the supply chain management factors that affect real estate industry but also examines the perceptions and expectations of the respective customers. This paper will enable the

real estate industry of Bangladesh with necessary course of actions and new business models which will enable the academia in developing its theory based on proven practice.

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