Modelling a New Marketing Strategy in the Real Estate Market: Lean and Green Mass Marketing Mix Tools

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Abstract

This study aims to determine what Business-to-Customer (B2C) green marketing (GM) mix tools best meet customers' expectations and enable Business-to-Business (B2B) lean and GM strategies to be implemented throughout the entire supply chain in the housing industry. This study introduces lean, GM and GM mix tools to the housing industry and the management of its supply chain. Residential projects were investigated to determine whether stakeholders are satisfying environmentally conscious customers' expectations. A questionnaire was used as a research method, and SPSS and AMOS were adopted with a view to developing GM mix tools. This study identifies sixteen GM tools and contributes to the marketing literature by introducing six new GM tools. Empirical testing of both direct and indirect estimations of the models adopted by the study enabled different target segmentation-oriented product-based and non-product-based GM mix tools to be identified, thereby indicating how each stakeholder's B2B GM mix tool implementation contributes to the B2C GM mix. Applying GM to the housing industry as a management philosophy can help this industry to be more sustainable and environment-friendly by providing a cleaner process and progression throughout the construction project lifecycle.

Keywords

lean marketing, green marketing, housing industry, business-to-business lean, business-to-customer lean, value creation, residential project marketing

1 Introduction

In recent years, environmental and sustainability and concerns have increasingly placed pressure on marketing and production management. Indeed, they have been recognised as a primary driver for management activities. Environmental awareness and the depletion of natural resources have attracted the attention of consumers, professionals, and academics around the world. Therefore, companies in different industries (e.g., Coca Cola, Dell, GM, Kodak, IBM, Toyota, Fuji Xerox, Wall Mart) have started to develop and implement proactive environmental and sustainable strategies to manage their supply chains in a green way (Zhang et al., 2019).

Green supply chain management (GSCM) refers to the management of operations and strategic functions in the product / service lifecycle, taking creation of economic, social, and environmental value for customers and stakeholders into account (Jug and Sarkis, 2019). Accordingly, GSCM has been the subject of many studies in the literature

and has been applied to different industries (Chu et al., 2018; Fetter, 2019; Kocsis and Kuslits, 2019). These studies, however, have focused on manufacturing industry where GSCM is positioned between supplier, manufacturer, and retailer/wholesaler (Liu and Xiao, 2019). The results of studies highlighted the importance of GSCM (Fetter, 2019, Liu and Xiao, 2019), green product production (de Caluwe, 2004), green partnership within GSCM (Saha et al., 2019), green price relations (Dan-li et al., 2011), and implementation of lean and green manufacturing paradigms (Amrina and Zagloel, 2019).

GSCM in the housing industry differs from the manufacturing industry mainly due to housing industry's unique project based features [e.g., offering a product-based heterogeneous product to the end customer, project-based restructuring of GSCM due to the unique characteristics of complex construction projects, producing new green product in every construction project, enabling participation

of different green stakeholders to the construction project management processes through arm length contract relationship (e.g., different material suppliers, designers, construction companies)] (Zhang and Li, 2011).

In both industries (i.e., housing and manufacturing industries), GSCM focuses on green product production and end customer green satisfaction (Business-to-customer (B2C)) and it is interconnected with B2B green relationships in the internal segment and / or sub-supply chains. Green marketing provides management of green product-oriented operations to the GSC from the B2B perspective with the selection of most appropriate green professionals (Vörösmarty and Dobos, 2019) while satisfying the customers' needs from a B2C perspective (Shah et al., 2017). Green marketing (GM) has become a topic attracting attention of scholars and companies operating in different industries to identify ways to implement sustainable and GM strategies in the GSC. These studies, however, have also mainly focused on manufacturing industry (Liu and Xiao, 2019). GM practices in the construction industry are limited (Tuz and Sertyesilisik, 2020). This study focuses on filling this gap in the literature by identifying B2B green marketing mix tools for stakeholders in GSC from a mass marketing perspective. Moreover, this study focuses on identification of B2C green marketing mix tools that can be applied to end customers.

This study is based on five different theories, namely: Business Network Theory (BNT), Resource Advantage Theory (RAT), Natural Resource Based View (NBRV), Shared Value Strategy (SVS), and Contingency Theory (CT). The housing industry differs from other industries in that it offers a heterogeneous product to the end customer (B2C) (Winch, 2006) due to the fact that its supply chain is built on B2B relationships between different stakeholders offering services/products (Li and Wang, 2016). Consequently, the implementation of green marketing in the housing industry is of vital importance, playing a significant role in the GSC of housing industry. Business Network Theory (BNT) suggests that it is the effective establishment of B2B relations that transmits the internal marketing strategies of stakeholders within the GSC (Gelei and Dobos, 2014; Welch and Wilkinson, 2002). Based on BNT, this study integrates green marketing into all stages of the housing construction process (i.e., pre-construction, construction, and post-construction), where stakeholders and their B2B green marketing strategies interconnect.

GSC aims to create value for end customers (Shah et al., 2017). RAT argues that creating value for end customers can be defined in terms of stakeholders' value creation potential (internal green marketing) (Green et al., 2015). Moreover, NBRV advocates the adoption of sustainability strategies that demonstrate environmental commitment based on organisational resources (Zhang et al., 2019). Porter et al. (2012) stated that a SVS can be achieved through social benefit-oriented business modelling and emphasised that creating shared value can be achieved at three distinct stages. The first stage involves focusing on failure to meet customer expectations of companies in the industry (internal plan), while the second stage consists of restructuring the product value chain in which these companies will be included (B2B relations) (Porter et al., 2012). The third stage includes providing social, environmental, and economic benefits to customers (B2C) while strengthening the business productivity in the related industry (Porter et al., 2012). Consequently, this study focuses on RAT, NBRV and SVS and their contribution towards enhancing value creation in the housing industry with respect to green marketing practices.

CT argues that the most appropriate management structure may be unavailable (Aziz et al., 2018). Fundamentally, it advocates the adaptation of stakeholders' strategies to match the desirable criteria of GSCs where they are willing to operate (Zhang et al., 2019). This study therefore focuses on residential projects (RP), with a view to determining what green marketing mix tools are most appropriate for the stakeholders from a mass marketing perspectives.

In this study, from a mass marketing perspective, we aimed to determine which customer satisfaction-oriented B2B GM mix tools can be applied among stakeholders at the different RP stages and to investigate how these B2B mix tools can contribute to B2C GM to ensure customer satisfaction.

Focusing on BNT, RAT, NBRV, SVS and CT as well as enhancing the adopted research (Maniatis, 2016; Ranaei Kordshouli et al., 2015; Tseng and Hung, 2013) with the Global Reporting Initiative (GRI) standards, plus preliminary and in-depth interview results, we empirically examined the B2B and B2C GM mix tools' implementation in RP from a mass marketing perspective. This research significantly contributes to the marketing literature in the housing industry by introducing six new GM mix tools. The findings can help stakeholders assess their internal GM plan, which can then be transmitted to B2B GM mix tools. Applying GM to the housing industry as a management philosophy can contribute towards housing becoming a more sustainable and environment-friendly industry that provides a cleaner process and progression

throughout the construction project lifecycle. Moreover, GM enhances customers' satisfaction through value creation, while improving the stakeholders' environmental brand identity and supporting their brand's successful operation in the competitive market.

2 The relationship between housing industry and green marketing

The housing industry differs from other service industries in that each housing construction project is unique in terms of its orientation (Liu and Xiao, 2019), its scope, size, and complexity (Preece et al., 2003), its involvement of different stakeholders (Li and Wang, 2016), and its output as it results in the production of different heterogeneous products and / or services (Demirkesen and Ozorhon, 2017).

As illustrated in Fig. 1, the housing industry has a long supply chain process shaped by the involvement of various stakeholders (e.g., suppliers, designers, construction companies and other professionals) at different stages of construction projects. As the output of each stage becomes an input to the next stage, B2B GM strategies play a significant role within the supply chain. Furthermore, B2C GM is shaped by the contributions of B2B GM strategies among the stakeholders.

3 Conceptual framework and hypotheses development

In this study, we have proposed a GM mix conceptual framework which combines modified traditional marketing mix tools with additional GM tools previously mentioned in the literature. Fig. 2 illustrates the proposed GM mix tools, showing how the GM mix is conceptualised for RPs in housing industry, plus what GM mix tools are possible, both from the B2B relationship's perspective as regards the management of the construction supply chain (CSC), as well as from the B2C relationship's perspective where the end customer is concerned.

We hypothesise that GM can be integrated to all stages of the lean construction project lifecycle, where the stakeholders that adopt a green strategy in their product-based background operations (internal GM plan) contact other stakeholders with their product-based GM mix tools. We therefore expect that green value that has been created or added through B2B GM within the production stages will enable the creation of B2C GM mix tools for the target customers. Therefore, we have determined the following to be our GM mix tools: green product, green price (GPRICE), green process (GPROCESS), LG, GSCM, green advertising (GADVER), green project (GPROJECT), and green corporate social responsibility (GCSR). The GM mix tools are discussed in Subsection 3.1.

3.1 Green product

A green product enables companies to operate with a proactive strategy in the market (Kinoti, 2011) that emphasises the main concerns of environmental protection, depletion of natural resources, energy savings and reductions in pollution and waste (Leonidou et al., 2013). A green product is based on a green supply chain process that drives the development of the GSTF, which is derived from characteristics that are important to end customers (e.g., green benefits, innovations, and product lifecycle management strategies) (Liu et al., 2012).

The green construction project life cycle is an essential component of RP preventing the natural resource depletion (Solaiman et al., 2015), with stakeholders cooperating to develop environmentally featured green product at all stages (Dangelico and Vocalelli, 2017). The green construction project life cycle is based on three main stakeholders that play a role in green product development i.e., suppliers (e.g., through more durable and reparable material supply) (Kinoti, 2011), designers (e.g., through green design development providing protection and/or
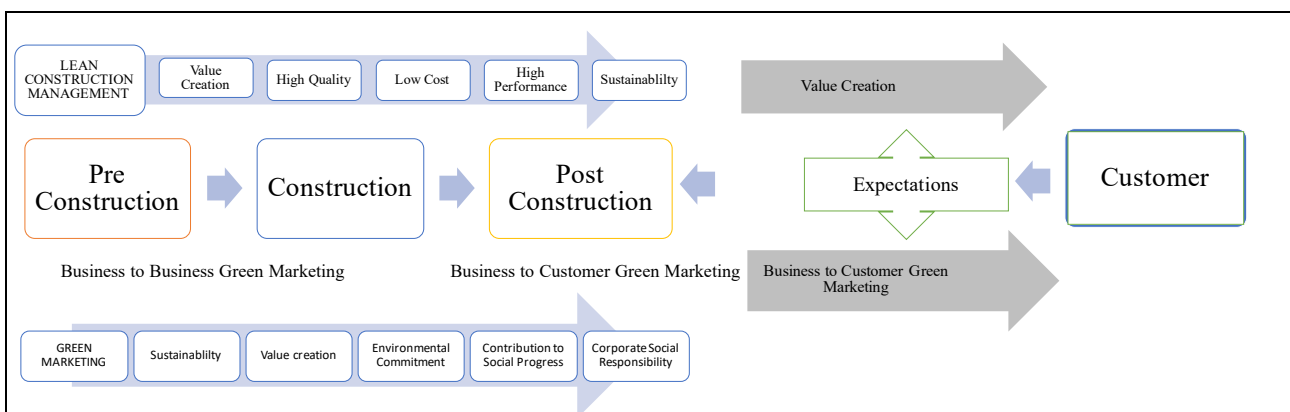

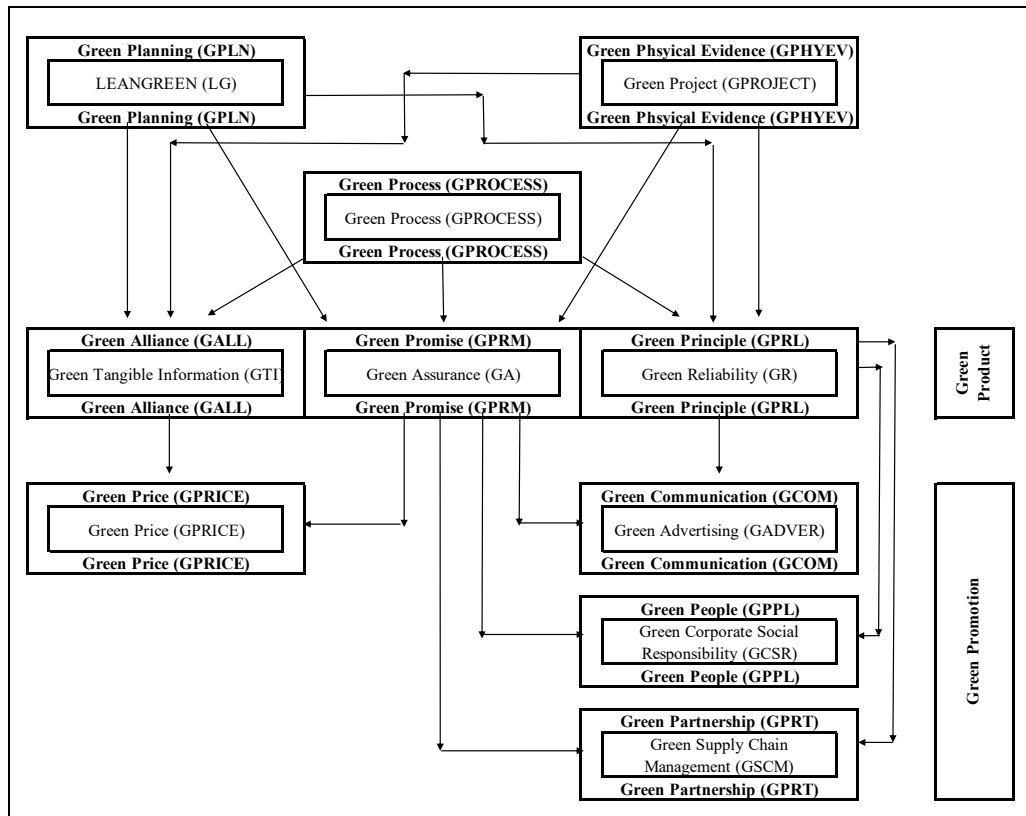**Fig. 1** Supply chain management in housing industry

Fig. 2 The proposed green marketing tools for RPs

enhancement of the natural environment), and construction companies (e.g., through waste reduction) (Dangelico and Vocalelli, 2017). In-depth interviews with 10 professionals and GRI standards analysis were performed within the scope of this article. The results of in-depth interviews with 10 professionals showed that providing clearly demonstrable information about the green properties of materials from the suppliers' perspective, combining design with environment-friendly products in the design process, and meeting green standards in operational processes are crucial to achieving overall customer green satisfaction. GRI standards emphasise the consistent and reliable reporting of sustainability impacts on companies' activities. The standards established for different industries play an important role in reporting the cumulative effects of supply chain stakeholders' actions on the economy, the environment and society (GRI, 2021). GRI standards (in particular, GRI 101, GRI 201 and GRI 301) have made it important to provide green tangible information about materials, to demonstrate green functional process performance, and to give a green guarantee about minimising environmental impacts during processes. Consequently, we focused on provable and tangible green product characteristics. We determined green tangible information (GTI), green

reliability (GR) and green assurance (GA) to be the significant green product characteristics that drive the green construction project life cycle.

3.1.1 Green tangible information – green alliance (GTI-GALL)

Green tangible information (GTI) relates to providing clearly evidential information on the greenness of products/services through each stakeholders' operational process (Kocsis and Kuslits, 2019). Products consisting of environment-friendly contents are prioritised in the design stage and achieving production of these products with green innovative technologies during construction stage realises a green alliance between the stakeholders, contributing to B2B green marketing. Previous research (i.e., Dangelico and Vocalelli, 2017; Kocsis and Kuslits, 2019; Tseng and Hung, 2013) found that GTI, which is one of the green product characteristics, has direct effect on green satisfaction (GSTF) of customer. The satisfaction of end customers, however, would be different depending on the variety of GTI content (Kocsis and Kuslits, 2019).

GSTF occurs when the end customers get more GTI about a product (Kapusy and Lógó, 2020). Furthermore, GSTF could enhance the green purchase intention of the

end customer (Tseng and Hung, 2013). Therefore, GTI, which is shaped by the stages in the production process, is more likely to enhance customer satisfaction. Regarding the acquisition of a unit from a RP, GTI is estimated to be an important green product antecedent on GSTF. When end customer encounters the GTI, which is shaped by the contributions of stakeholders, end customer is expected to be greenly satisfied. Therefore, GTI, supported by the green alliance between stakeholders, can lead to an increase in the customer satisfaction (Kapusy and Lógó, 2020; Kocsis and Kuslits, 2019). Thus, the first hypothesis is as follows:

- H1: GTI has direct impact on GSTF.

3.1.2 Green assurance – green promise (GA-GPRM)

Green assurance (GA) is a green product-based guarantee, which demonstrates minimisation of the products' environmental footprint (Tseng and Hung, 2013). The stakeholders build green B2B relationship in construction GSC, where suppliers promise the green product assuring minimized environmental impact, prove recyclability ratio and rates of energy conservation. Green promise can enhance green security of construction projects through the designers' green promised product selection in green design development phases, taking energy efficiency into account. Moreover, the construction phase includes the purchase of reusable and recyclable materials, the supply of green materials, and the usage of energy efficient green technology and green design. Therefore, these involvements can provide an answer to the construction project's environmental concerns (Pomering, 2017). A green product must build trust with the environment-friendly customer and indicate what has been done to minimise environmental deterioration (Tseng and Hung, 2013). As the output of each stakeholder will be the input to others in the CSC, the main factor in ensuring GSTF in the RP is to provide a GA for the end customer built on green promises among stakeholders contributing to B2B green marketing. Therefore, the more such a GA is reflected in a green promise that the end customer finds trustable, the more is the end customers' GSTF. Thus, the second hypothesis is as follows:

- H2: GA has direct impact on GSTF.

3.1.3 Green reliability – green principle (GR-GPRL)

Green reliability (GR) is an important green product-based marketing tool that expresses the reliability of functional performance and compliance with the green criteria of the construction project. Indicating low CO_2 emissions while producing green product, GR refers to meeting the established standards in the operational characteristics of the supplied product (Kapusy and Lógó, 2020). Furthermore, energy efficiency and indoor air quality requirements can be deemed design criteria at the design stage and can be implemented with technologies that meet the green building certification criteria (Tseng and Hung, 2013). GPRL is a crucial component of the B2B GM tool, which establishes a green connection between the stakeholders and their environmental brand images (Pomering, 2017). Previous research (Dangelico and Vocalelli, 2017; Kocsis and Kuslits, 2019; Tseng and Hung, 2013) shows a strong relationship between green promises and green standards in satisfying end customers based on the operational performance of the stakeholders and their compliance with design criteria. Meeting the green operational criteria during the production stages, suppliers create green value for the other stakeholders with GPRL contributing to B2B green marketing. Value creation is followed by designers with the implementation of the green standards to RPs. Finally, the construction company develops green products through green resource allocation and green technology implementation to meet green building certification targets (Preece et al., 2003) that provide green value to the end customer and increase green customer satisfaction. Thus, the third hypothesis is as follows:

- H3: GR has direct impact on green satisfaction.

3.2 Green process (GPROCESS)

Green process (GPROCESS) is indicative of green management efforts and eco-friendly production processes (Pomering, 2017) and involves flow of environment-friendly activities (e.g., material supply, service delivery mechanisms and construction processes) in the CSC. GPROCESS focuses on enhancing the resource efficiency and waste minimisation in the operational processes of the suppliers, designers, and construction firms to improve the green effectiveness of the CSC (Liu et al., 2012). Focusing on carbon footprint reduction, GPROCESS can enable stakeholders to apply green principles to their own production processes and/or supply chains (Pomering, 2017). This can improve efficiency, ensure efficient use of resources and result in effective time management. Moreover, it can help minimise CO_2 emissions from the housing industry's GSCM (Hopkins, 2011). The closed-loop characteristic of CSC requires all of the stakeholders to collaborate in minimising environmentally and socially adverse

impacts, which can be achieved by focusing on individual processes (Liu et al., 2012). Therefore, the fourth hypothesis is as follows:

- H4: GPROCESS has direct impact on GSTF.

3.3 Leangreen – green planning (LG-GPLN)

As GM focuses not only on environmental welfare but also on zero waste and pollution in production process, the integration of green marketing into the supply chain ensures that the production process is environment-friendly as well as present- and future-oriented (Quoquab and Mohammad, 2016). The literature (i.e., Szabó, 2018; Quoquab and Mohammad, 2016) emphasises that the lean pull factor is compatible with GM with a view to managing demands and producing the right quantity of environment-friendly products / services at the right time.

Green resource allocation can ensure that the environmental footprint of the end product is minimised, and that green design development goals are achieved (Ranaei Kordshouli et al., 2015), while green reverse logistics focuses on the effective use of recyclable and reusable environment-friendly green material / products (Kinoti, 2011). Focusing on waste minimisation in terms of materials, time and efforts as well as the maximisation of performance in the design and construction stages, green planning (GPLN) can enable the acceleration and enhancement of quality and assure the sustainability performance of a construction project (Szabó, 2018). Furthermore, LG can help to maximise a construction project's value through zero waste, cost savings, a high quality end product, just-in-time production, the enhanced safety of the workers, and the sustainability of the project (Marhani et al., 2013).

From a B2B GM perspective, green planning involves the implementation of environmental policy throughout the CSC, which highlights the need for appropriate sustainable stakeholder selection/appointment to satisfy the end customers' green demands (Vörösmarty and Dobos, 2019). Furthermore, green planning can ensure that stakeholders focus on green strategies with through the allocation of green resources and the implementation of innovative technologies (Liu et al., 2012). Thus, the fifth hypothesis is as follows:

- H5: LG has direct impact on GSTF.

3.4 Green project – green physical evidence (GPROJECT-GPHYEV)

A green project (GPROJECT) consists of tangible information that reveals the construction projects' green parti-

cipants, and documents their sustainable and environmentally friendly interaction (Pomering, 2017). Consideration of each stakeholder's supply/contribution to the green RP as regards physical products/services, the development of designs and management of the implementation process management, plus the involvement of various environmentally concerned stakeholders to the CSC can ensure that a green construction project is achieved (Pomering, 2017). From a B2B GM perspective, green physical evidence comprises information about construction green supply chain members, the sustainability orientation of the stakeholders' products/services, the existence of publicly open sustainability and environmental reporting systems, the endorsements of third parties, the provenance of green products/services, and the greenness and eco-friendliness of the products/services themselves (Pomering, 2017). Green physical evidence can ensure that the green demand of end customers is met by together embodying the green capabilities, commitment and green operations of supply chain members (Liu et al., 2012). Thus, the sixth hypothesis is as follows:

- H6: GPROJECT has direct impact on GSTF.

3.5 Green price (GPRICE)

GPRICE refers to pricing strategies of companies regarding their environmental consideration policies (Solaiman et al., 2015). Moreover, it reflects the accounting of both the economic and environmental costs of production with a fair profit (Leonidou et al., 2013), which provides value creation for the end customers. Modification of green value created production process in the context of each stakeholder's greenly priced operations have a direct effect on the perceived quality and price, which in turn directly affects the customers' purchase intention (Dawes et al., 2017). GPRICE provides creation of GM strategies through customer segmentation. The relationship between the customers' environmental attitudes and green purchasing behaviour is significant for GM strategies, where the GPRICE is one of the determinants of segmentation (Solaiman et al., 2015). Reflecting the social and environmental costs in the present GPRICE can provide value creation to customers while enhancing competitiveness of the companies in the marketplace (Abzari et al., 2013). Possessing a long construction GSCM process, environmentally strategically oriented stakeholders can enhance the creation of value through green pricing strategies. Green pricing can vary based on the stakeholders' role in the GSCM as well as companies' pricing strategies

covering their environmental consideration policies, internalised environmental costs, steps taken to enhance a high-quality low-price perception, their green priced-green brand philosophy, and environmentally conscious networking (Vörösmarty and Dobos, 2019). Thus, the seventh hypothesis is as follows:

- H7: GPRICE has direct impact on GSTF.

3.6 Green promotion

Green promotion is an important GM mix tool which highlights the environment-friendly features of the product / service (Kinoti, 2011) and represents the environmental corporate awareness of companies. Reflecting companies' green performances, strategies and environmental concerns, green promotion can contribute to the establishment of a green relationship with other stakeholders and target customers (Zhu and Sarkis, 2016). The tactical environment-friendly focus of a RP (Leonidou et al., 2013) and green interactions between the end customers and the RP are both constructive results for GSTF. In addition to the environmental benefits of end products (GADVER), the strategic introduction of the green supply chain (GSCM) (Leonidou et al., 2013), social corporate activities of stakeholders (GCSR) (Solaiman et al., 2015), green strategies and actions can lead to the creation of green value for end customers (Kumar, 2016). Therefore, B2C green promotions where a RP transmits stakeholders' GSCM, social responsibility and green advertising can all lead to the end client's GSTF. The hypotheses are as follows:

- H8: GADVER has a direct impact on GSTF;
- H9: GCSR has a direct impact on GSTF;
- H10: GSCM has a direct impact on GSTF.

The green product information shows that, conceptually, the green product is offered as a combination of basic properties (GTI, GA, GR) and that individual application of these properties, which provide different green properties, has a significant impact on ensuring GSTF (Kapusy and Lógó, 2020; Kocsis and Kuslits, 2019). We accept not only that the product / service provides the green benefit provided by the basic features, but also that the interactions of these features can bring more green benefits to the customer. Therefore, we believe that the combination of these basic characteristics can lead to an increase in customer satisfaction. The hypotheses are as follows:

- H11: GALL has a mediator role in the relationship between GA and GSTF;
- H12: GALL has a mediator role in the relationship between GR and GSTF;

- H13: GPRM has a mediator role in the relationship between GTI and GSTF;
- H14: GPRM has a mediator role in the relationship between GR and GSTF;
- H15: GPRL has a mediator role in the relationship between GTI and GSTF;
- H16: GPRL has a mediator role in the relationship between GA and GSTF.

4 Research method

The questionnaire was developed and structured referring to the construction of the conceptual model to test the research hypotheses. The questionnaire was designed based on the GRI sustainable reporting standards, literature reviews, and the results of the in-depth interviews with ten executives working in the housing industry. The questionnaire was adapted from Tseng and Hung (2013), Ranaei Kordshouli et al. (2015) and Maniatis (2016) as these sources were chosen as benchmark research studies, further supported by our literature review, plus the preliminary and in-depth interviews with professionals and the GRI standards. The questionnaire was developed using a scale development procedure and structured in two parts. The first part aimed to identify the respondent's demographics. The second part was developed using a scale development procedure and structured, covering altogether 88 questions. The scales were abbreviated; a 5-point Likert scale was used as a multi-item semantic differential scale in the questionnaire to collect and measure the respondent's data. The second part focused on the determination of construction project GM tools' impact on customers' purchasing behaviour for a RP. Thus, the study aimed to highlight the following objectives in terms of mass marketing:

- Determination of GM mix tools of RPs with B2C GM focus,
- Determination of CSC stakeholders' GM mixes with B2B marketing focus,
- Determination of the contributions of stakeholders' B2B GM mixes to the B2C GM,
- Determination of the stakeholders' individual GM plan affecting the B2B GM mix.

Therefore, the research question was formulated as: *Which GM mix tools' implementation in RP can effectively meet the customers' green expectations in the mass marketing?*

Fig. 3 illustrates the stages of the research methods. The second part was firstly analysed with SPSS 23.0 through different methodologies for reliability and validity analysis such
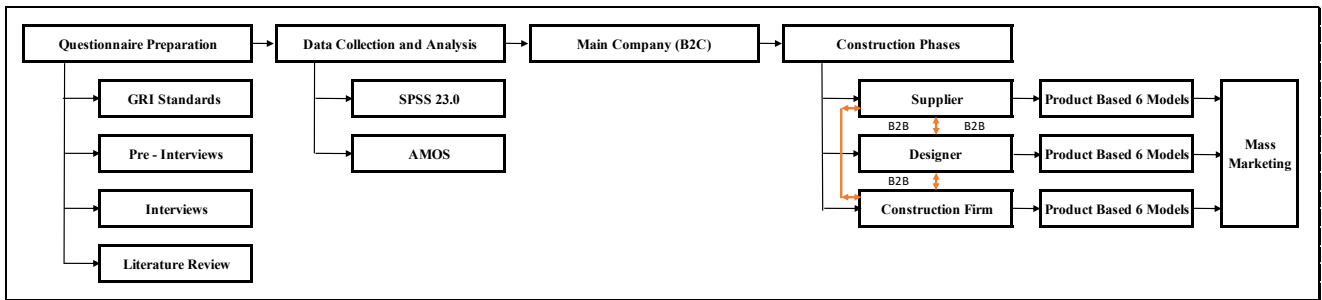
Fig. 3 The stages of research methods

as Cronbach's Alpha Coefficient and KMO and Bartlett's Test through Factor Analysis. The gathered data was analysed with AMOS 23 to estimate and test the structural equation modelling (SEM) (Ranaei Kordshouli et al., 2015).

4.1 Data analysis
The survey was applied to potential end customers. The sample population was chosen according to a random sampling method, and a 95% confidence level and 5% confidence interval were determined. The questionnaire was applied face-to-face on a voluntary basis to participants over the age of 18 of both genders. Analysis of the demographic profiles of the participants showed that 60.8% of the participants were women. 57.2% of the sample population is married.

4.2 Fitness, validity, and reliability of models
Standardised Factor Loadings, Composite Reliability Values, Cronbach Alpha coefficients and KMO and

Bartlett's Test were used to analyse the GM constructs in SPSS 23.0 to find out the reliability of the grouping of factors. Table 1 summarised the fitness, validity, and reliability results of the analyses.

It is suggested in the literature that standardised loads should be at least 0.4 (Ford et al., 1986). All minimum standardised factor loads on the construct basis are above 0.532. Moreover, composite reliability indicates the internal consistency of factor-based indicators (Tseng and Hung, 2013), which are ranged from 0.784 to 0.938. Moreover, composite reliability indicates the internal consistency of factor-based indicators (Tseng and Hung, 2013), which are ranged from 0.784 to 0.938. Cronbach Alpha Method is used for testing the constructs' validity and reliability as a tool, where 0.6 is recommended to be taken as Cronbach Alpha's threshold for survey analysis in social research studies (Maniatis, 2016). KMO and Bartlett's Test through factor analysis are assessed to the scales for measuring the reliability of the questionnaire.

Table 1 Fitness, validity and reliability tests results

Constructs	Standardised loadings (min)	Composite reliability	Average variance extracted	Cronbach's alpha	KMO and Bartlett's test
GA	0.705	0.841	0.569	0.743	0.699
GR	0.601	0.784	0.549	0.580	0.592
GTI	0.682	0.936	0.531	0.854	0.882
GTI -GPRM	0.719	0.938	0.627	0.867	0.873
GTI -GPRL	0.775	0.931	0.659	0.796	0.788
GA-GALL	0.719	0.938	0.627	0.867	0.873
GA -GPRL	0.831	0.926	0.716	0.722	0.713
GR-GALL	0.752	0.924	0.669	0.751	0.719
GR-GPRM	0.718	0.907	0.619	0.731	0.655
GSCM	0.778	0.932	0.663	0.810	0.793
GADVER	0.738	0.904	0.654	0.701	0.674
GCSR	0.735	0.873	0.632	0.799	0.741
LG	0.557	0.918	0.557	0.713	0.803
GPROCESS	0.532	0.928	0.593	0.713	0.744
GPRICE	0.701	0.915	0.684	0.640	0.589
GPROJECT	0.740	0.859	0.507	0.588	0.613
GSTF	0.715	0.866	0.519	0.807	0.832

The KMO and Bartlett's Sphericity factor analyses were used to find out the reliability of the grouping of factors, which should be above 0.05 (García-Madariaga and Rodríguez-Rivera, 2017). The Cronbach Alpha, the KMO and Bartlett's Sphericity factor results exceeded the recommended values of 0.6 for the former (de Caluwe, 2004) and 0.5 for the later analysis (García-Madariaga and Rodríguez-Rivera, 2017).

The average validity extracted (AVE) value denotes the convergent validity of each construct and should be minimum 0.5 (Hajmohammad et al., 2013). The results of all constructs vary from 0.507 to 0.716.

Statistical analyses were used to test the 16 identified hypotheses and were performed in SPSS 23 to evaluate factor loads. The cumulative (%) extraction sums of squared loadings should be above 50% (Hajmohammad et al., 2013) and the amount of factor loading analysis results should be determined for Eigenvalue greater than 1 (Papadas et al., 2017). Factor loading analysis results with Eigenvalue greater than 1 indicated that 16 different factors were determined and provided 88.89% as cumulative (%) extraction sums of squared loadings.

Confirmatory Factor Analysis (CFA) was applied to gathered data through AMOS to test the fitness of the model, the reliability, and the validity of the proposed GM mix models. The analyses were made from the mass marketing perspective to all data. Furthermore, all hypotheses were analysed for each stakeholder of housing construction projects. Table 2 represents the CFA testing results of the models.

The CFA analysis of the models resulted in a maximum of 2.966 in CMIN/df (< 3 cut-off value), in a minimum of 0.95 in goodness-of-fit index (GFI) ($\geq$ 0.9 cut-off value), in a minimum of 0.946 in comparative fit index (CFI) ($\geq$ 0.9 cut-off value), in a minimum 0.927 in adjusted goodness-of-fit index (AGFI) ($\geq$ 0.9 cut-off value), in a minimum 0.921 in normed fit index (NFI) ($\geq$ 0.9 cut-off value), in a minimum 0.946 in incremental fit index (IFI) ($\geq$ 0.9 cut-off value), in a minimum 0.602 in parsimonious normed fit index (PNFI) ($\geq$ 0.5 cut-off value), in a minimum 0.614 in parsimonious comparative fit index (PCFI) ($\geq$ 0.5 cut-off value), and in a maximum 0.06 in root mean square error of approximation (RMSEA) ($\leq$ 0.08 cut-off value), and in a maximum 0.03 in root mean square residual (RMR) ($\leq$ 0.1 cut-off value) (Maniatis, 2016; Ranaei Kordshouli et al., 2015; Tseng and Hung, 2013). According to the results, each model provided the recommended cut-off values of indices separately, which show the goodness of fit of the structural models.

Table 2 CFA testing results – mass marketing

Main model number	AGFI	RMR	NFI	IFI	PNFI	PCFI	CMIN/df	GFI	CFI	RMSEA
A1	0.927	0.028	0.934	0.956	0.739	0.756	2.881	0.95	0.955	0.058
A2	0.934	0.028	0.927	0.951	0.688	0.706	2.829	0.959	0.951	0.057
A3	0.928	0.027	0.934	0.956	0.739	0.756	2.853	0.951	0.956	0.058
A4	0.961	0.021	0.964	0.98	0.616	0.626	2.244	0.98	0.98	0.047
A5	0.945	0.029	0.922	0.947	0.635	0.652	2.932	0.969	0.946	0.059
A6	0.946	0.028	0.930	0.954	0.641	0.657	2.832	0.969	0.953	0.057
A7	0.927	0.029	0.932	0.955	0.717	0.734	2.84	0.952	0.954	0.058
A8	0.945	0.03	0.936	0.959	0.646	0.662	2.629	0.968	0.959	0.054
A9	0.934	0.029	0.937	0.958	0.720	0.737	2.779	0.957	0.958	0.057
A10	0.946	0.026	0.940	0.962	0.667	0.682	2.626	0.968	0.962	0.054
A11	0.939	0.028	0.931	0.956	0.691	0.709	2.714	0.962	0.955	0.056
A12	0.936	0.028	0.926	0.952	0.688	0.706	2.739	0.96	0.951	0.056
A13	0.942	0.03	0.939	0.959	0.683	0.698	2.874	0.965	0.947	0.058
A14	0.969	0.018	0.964	0.983	0.642	0.656	1.809	0.983	0.983	0.038
A15	0.946	0.030	0.940	0.960	0.669	0.682	2.966	0.968	0.959	0.060
A16	0.943	0.028	0.921	0.946	0.635	0.651	2.955	0.968	0.946	0.059
A17	0.949	0.023	0.953	0.969	0.609	0.619	2.93	0.974	0.969	0.059
A18	0.950	0.027	0.943	0.961	0.602	0.614	2.942	0.975	0.961	0.059
Criteria	AGFI	RMR	NFI	IFI	PNFI	PCFI	CMIN/df	GFI	CFI	RMSEA
Tseng and Hung 2013; Kordshouli et al. 2015; Maniatis 2016;	> 0.9	$\leq$ 0.10	$\geq$ 0.9	$\geq$ 0.9	$\geq$ 0.5	$\geq$ 0.5	< 3	$\geq$ 0.9	$\geq$ 0.9	$\leq$0.08

4.3 Results

SEM was performed to test the hypotheses. 18 sub-models were created to identify GM mix tools for RP's stakeholders (i.e., suppliers, designers, construction firms). The results were analysed from a mass marketing perspective.

The hypotheses testing results are shown in Table 3. The results indicated that GM mix tools have a significant impact on green satisfaction of end customers in housing industry at 95% CI.

The conducted analysis showed that GA (H2) and GR (H3) of all stakeholders have statistically significant direct effect on the GSTF at 95% CI. The results showed, however, that GTI was only affected by suppliers (GTIS) (H1: 95% CI, [0.143, 0.357]) and designers (GTID) (H1: 95% CI, [0.125, 0.360]).

The results in Table 4 showed that GPROCESS (H4), LG (H5), GPROJECT (H6), GPRICE (H7), GADVER (H8), GCSR (H9), and GSCM (H10) have a significant impact on the GSTF at 95% CI of end customers. In addition, the results highlight the contribution of individual GM tools implemented by stakeholders as well as B2B GM tools implemented between stakeholders to B2C GM tools.

The study has adopted a product-based GM strategy that focuses on the different green contributions of each stakeholder to the final heterogeneous product. Therefore, the analysis focused on determination of the indirect effects of product properties on each other.

The indirect effects were determined through the implementation of the bias-corrected bootstrap method, which is known as the proven model for confidence interval generation in mediation analysis at 95% CI (So et al., 2017). Table 4 provides the bias-corrected bootstrap method analysis results.

Structural models provided an assessment of the mediation effect of the hypotheses on emerging green product-based marketing tools.

The results showed that GALL has statistically significant indirect effects on GA (H11) at 95% CI for all stakeholders and contribute to partial mediated effects on GSTF. On the other hand, GALL does not have a statistically significant indirect effect on GR for suppliers at 95% CI (H12).

GPRM has statistically significant indirect effects on both GTI (H13) and GR (H14) at 95% CI for all stakeholders and contribute to partial mediated effects on GSTF.

Table 3 Hypotheses testing results – mass marketing

Hypothesis		Supplier					Designer		Construction firm	
		Std. Est.	S.E.	C.R.	P	Decision	P	Decision	P	Decision
GSTF ← GTI	H1	0.253	0.044	4.81	***	S	***	S	0.218	NS
GSTF ← GA	H2	0.198	0.036	3.677	***	S	***	S	***	S
GSTF ← GR	H3	0.296	0.15	3.214	0.001	S	0.001	S	0.016	S
GSTF ← GPROCESS	H4	0.311	0.054	5.203	***	S	***	S	***	S
GSTF ← LG	H5	0.246	0.051	4.13	***	S	***	S	***	S
GSTF ← GPROJECT	H6	-0.003	0.081	-0.051	***	S	***	S	***	S
GSTF ← GPRICE	H7	0.544	0.066	7.824	***	S	***	S	***	S
GSTF ← GADVER	H8	0.372	0.045	5.592	***	S	***	S	***	S
GSTF ← GCSR	H9	0.557	0.059	7.762	***	S	***	S	***	S
GSTF ← GSCM	H10	0.241	0.09	3.651	***	S	***	S	***	S

*** Indicates significances at $p < 0.01$ level; S: Supported; NS: Not Supported.

Table 4 Bias-corrected bootstrap method analysis results

Hypothesis	Supplier						Designer		Construction firm	
	C.I.	Std. Est.	S.E.	C.R.	P	Lower Bound - Upper Bound	P	Lower Bound - Upper Bound	P	Lower Bound - Upper Bound
GSTF ← GALL ← GA	95%	0.246	0.42	4.769	***	[0.096–0.266]	***	[0.051–0.239]	0.002	[0.045–0.215]
GSTF ← GALL ← GR	95%	NA	NA	NA	NA	NA	***	[0.21–1.063]	0.018	[0.014–0.365]
GSTF ← GPRM ← GTI	95%	0.24	0.043	4.558	***	[0.116–0.323]	***	[0.058–0.242]	***	[0.044–0.174]
GSTF ← GPRM ← GR	95%	0.184	0.049	3.262	0.001	[0.092–0.625]	***	[0.247–1.074]	0.004	[0.085–0.575]
GSTF ← GPRL ← GTI	95%	0.274	0.58	4.973	***	[0.071–0.304]	NA	NA	0.044	[-0.002–0.101]
GSTF ← GPRL ← GA	95%	0.169	0.123	3.004	0.003	[0.061–0.268]	0.002	[0.071–0.264]	0.002	[0.045 – 0.215]

*** Indicates significances at $p < 0.01$ level
NA Specifies the nonworking model

GPRL has statistically significant indirect effects on GA (H15) at 95% CI for all stakeholders, but indirect effects of GPRL on GTI (H16) were only seen for suppliers.

Structural models showed statistically significant partial indirect effects of GTI, GA and GR on GSTF via GPRM, GPRL and GALL at 95% CI. Therefore, GTI-GPRM (Green Efficacy) (H13), GTI-GPRL (Green Convenience) (H15), GA-GALL (Green Harmony) (H11), GA-GPRL (Green Confirmation) (H16), GR-GPRM (Green Proven Benefits) (H14), and GR-GALL (Green Proven Context) (H12) can be defined as new GM mix tools for all stakeholders in the CSC management. As it can be seen in Table 5, 16 different B2C GM mix tools are conceptually shaped by the B2B GM mixes that transmit the internal GM mixes of stakeholders. As a result, from the mass marketing perspective, the main company can implement the determined green B2C marketing mix to meet the needs and expectations of the end customers. Furthermore, the internal GM mix tools and their transition to the B2B GM practice is strategically important not only for stakeholders to be able to take part in the green RP supply chain, but also for the main company to identify the stakeholders.

5 Discussion
The direct effects of the GM mix tools on GSTF (i.e., from H1 to H11) are compatible with our expectations from a mass marketing perspective. Moreover, the results support shared value strategy development (Porter et al., 2012), GM's integration into the GSC (Shah et al., 2017) and segmentation of green stakeholders (Bai et al., 2017).

The importance of GSCM in the manufacturing industry has been acknowledged in the literature (Fetter, 2019, Liu and Xiao, 2019) and has been widely recognised by professionals. This study, however, focuses on the housing industry, specifically on RPs, and highlights the importance of lean and GM practice in creating value for end customers.

The results indicated that in terms of meeting the needs and expectations of the end customers for green housing marketing, the determination of the GM mix elements varied according to the position of stakeholders in the supply chain. This confirms that the determination of GM mix elements depends on how the mass marketing strategy is implemented. Overall, it was determined that there are 16 different GM mix tools that can be applied to GM strategies. The results showed that a product-based GM mix tool implementation can positively affect the GSTF of customers due to the heterogeneous feature of the RP. Therefore, individually structured models for all stakeholders in the housing construction project fitted well with the hypotheses. As can be seen in Fig. 1, B2C GM mix tools can ensure the GSTF of end customers and they are important in determining the individual GM mix required

Table 5 Green marketing mix tools – mass marketing

Contributors to B2C Green Marketing Mix (B2B Green Marketing Mix)					
		Supplier	Designer	Construction firm	Main firm
Internal	B2B	B2B	B2B	B2B	B2C
GTI	GALL	✓	✓		GTI
GA	GPRM	✓	✓	✓	GA
GR	GPRL	✓	✓	✓	GR
GTI-GPRM	GTI-GPRM	✓	✓	✓	GTI-GPRM
GTI-GPRL	GTI-GPRL		✓	✓	GTI-GPRL
GA-GALL	GA-GALL	✓	✓	✓	GA-GALL
GA-GPRL	GA-GPRL	✓	✓	✓	GA-GPRL
GR-GPRM	GR-GPRM	✓	✓	✓	GR-GPRM
GR-GALL	GR-GALL		✓	✓	GR-GALL
GSCM	GPRT	✓	✓	✓	GPRT
GADVER	GCOM	✓	✓	✓	GCOM
LG	GPLN	✓	✓	✓	GPLN
GPROCESS	GPROCESS	✓	✓	✓	GPROCESS
GPRICE	GPRICE	✓	✓	✓	GPRICE
GPROJECT	GPHYEV	✓	✓	✓	GPHYEV
GCSR	GPPL	✓	✓	✓	GPPL

GTI-GPRM (Green Efficacy), GA - GALL (Green Harmony), GR - GPRM (Green Proven Benefits);
GTI-GPRL (Green Convenience), GA - GPRL (Green Confirmation);
GR - GALL (Green Proven Context).

for effecting a transition to B2B GM mix practices. The results of the models suggested that different B2C GM mixes may shape the GM mix of stakeholders to meet the needs and expectations of the end customer. Therefore, the results led to the identification of internal marketing strategies for each stakeholder and B2B GM mixes for the mutual relationship of stakeholders.

This study, which aims to adapt the GM mix to the housing industry, proposed product-based and non-product-based GM mix models that transmit the contribution of each stakeholder's B2B GM mix tool implementation to the B2C

GM mix tools. Furthermore, the study contributed to the literature through empirically testing direct and indirect estimators of models aimed at identifying the different target segmentation oriented B2C GM mixes shaped by each stakeholder's B2B marketing mix tools. Thus, the derived theoretical and practical implications of this study are hereby summarised.

5.1 Theoretical implications

This study contributes to the BNT, RAT, NBRV, SAS, CT and lean and GM marketing literature. Underpinning the combination of the theories provides to and enhances understanding of how lean and GM marketing mix tools ensure GSTF in RPs.

The heterogeneous features of the RP point out that GM mixes should be created through the contribution of each product included in the project. In line with the previous studies (Maniatis, 2016; Ranaei Kordshouli et al., 2015; Tseng and Hung, 2013) the green product was categorised and new GM mixes such as green efficacy (GTI-GPRM), green convenience (GTI-GPRL), green harmony (GA-GALL), green confirmation (GA-GPRL), green proven context (GR-GALL) and green proven benefits (GR-GPRM) were created and equipped with different features of all stakeholders, contributing to the literature. Furthermore, supporting the product-oriented GM mix with non-product-oriented marketing mixes can positively affect customer satisfaction in the housing industry and can have a significant impact on the purchase intent of end customers. Therefore, the results show that the 16 different GM mix tools proposed can enhance the satisfaction of end customers.

The GM mix implementation differs based on marketing strategies. From the mass marketing perspective, the results suggest that the main company can implement the 16 green B2C marketing mix tools to meet the needs and expectations of end customers. In addition, the internal

GM mix tools and their application to B2B GM practice are strategically important not only for stakeholders to be able to take part in the green RP supply chain, but also for the main company to identify the correct stakeholders.

5.2 Managerial implications

This study suggests several managerial implications for professionals with respect to the results of the research. First, this study consolidates the needs for the GM mix implementation to satisfy the end customers' needs and expectations in the housing industry in a green manner. The outputs of this study may show how the main companies may expand the GM mix implementation in a RP through the supply chain and thereby satisfy an environmentally conscious end customer. This study suggests that professionals in RP should encourage the adoption of a GM mix in their operations. For this reason, professionals should prioritise the identification of green needs and the expectations of their target market segment and likewise, choose to work with stakeholders that can satisfy the end customers' green preferences.

The study provides recognition of the green stakeholder's presence in RP supply chain management with a view to improving the GSTF of end customers. Thus, based on BNT, the B2C GM mix can be shaped and built on green B2B marketing mix tools. Therefore, to meet the green expectations of end customers from a RP, professionals should focus on green stakeholder selection for the GSCM of RPs considering establishing green B2B marketing relationships.

The study demonstrates the importance of each stakeholder's internal GM in creating value for RP's end customers. Moreover, the study enables one to understand that B2B GM reflects the value creation potential of stakeholders. Therefore, according to the RAT and NBRV, professionals should understand how to adopt GM as a management strategy and focus on how to transform their internal marketing plan to GM.

The study reveals the importance of GSCM in housing industry in terms of RP. To meet green expectations in an environmentally friendly way and to create value for end customers, it is essential to select green stakeholders who can ensure the implementation of shared value strategies. With respect to SVS, professionals should concentrate on establishment of a social benefit-oriented supply chain that enhances value creation while providing organisational benefits to stakeholders.

As a result of the research, 16 different GM mix tools were proposed. These proposed GM mix tools differentiate

based on the stakeholder's position in the supply chain. In relation to CT, professionals operating in the residential industry should adapt the lean and GM strategies proposed in this study to meet the desired green criteria of the RP's GSC. The findings are significant and can guide the stakeholders to assess their internal GM plan which can be transmitted to B2B GM mix tools. Not all the 16 identified GM mix tools may have a decisive influence on end customers' green purchase intention simultaneously. The effective ones, however, will form the subsets of these GM mix tools identified in this study. Thus, for all stakeholders of the RP supply chain, the specified GM mix tools are significant, which can be differentiated depending on the marketing strategy to be implemented according to the stakeholders' role in the GSC of housing industry. However, when implementing the B2C GM tools, the main company should focus on the green expectations of the end customer and plan the supply chain with appropriate stakeholders who adopt GM strategies internally to meet the green expectations of the end customer.

6 Conclusion

This study firstly aimed to adapt GM to the housing industry. Furthermore, this study aimed to determine B2C mix tools that ensure to meet the green expectations of end customers and determine B2B lean and GM marketing mix tools that can be implemented throughout the entire GSCM of housing industry. From the BNT, RAT, NBRV, SVS and CT perspective, this study focused on developing SEM and empirically examined the implementation of lean and GM mix tools across stakeholders and for RP's end customers. This research significantly contributes to the marketing literature in the construction industry through introducing lean and GM and its mix tools to the housing industry.

In addition to its important contributions, the study has some limitations. The current study analysed specifically the housing industry to validate the effects of GM mix tools' implementation on meeting the needs and expectations of end customers in an environment-friendly way. This can be considered a limitation. Future studies could examine different service industries to assess and determine the suitable GM marketing mix tools in their operations. In addition, this study focused on the housing industry from mass marketing perspective; future studies could focus on different target segments from a niche marketing perspective. Future studies might also focus on different types of construction projects such as industrial projects, infrastructure projects, commercial and institutional projects to assess the implementation of GM mix tools. In addition, future research can focus on different project-based industries (i.e., naval architecture and shipbuilding industry) to evaluate and determine the suitable GM marketing mix tools. It must also be acknowledged that technological advances and the impact of industrial 4.0 on the construction industry are beyond the scope of the study. Future research could evaluate and identify GM mix tools taking the impact of industry 4.0 into account.

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