Competition and management of wood-cement compositions among light concretes in the market of construction materials

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Abstract. The paper describes the stages and motivation of a reasonable choice when purchasing construction materials for low-rise housing in B2C and B2B segments. Due to the optimal combination of indicators of strength, thermal conductivity, low cost in the market of construction materials for low-rise housing, light concretes took a stable position as a thermal insulation construction material. Light concretes are divided into aerated concretes and foam concretes, as well as concretes based on wood-cement compositions. The volumes of aerated and foam concrete production and consumption are hundreds times as high as the production of wood-cement compositions. The negative attitude of the consumers to the processed products and the high price of such materials are deterrence to the wide distribution of wood-cement compositions in low-rise housing. The policy of integrated use of renewable wood resources can be the basis for increasing the production and consumption of wood-cement compositions.

1. Introduction

The purpose of the study is the search of the methods of the effective management of construction materials based on wood-cement compositions.

Achieving the purpose implies the following tasks:
- analyzing the potential market segment, possible consumption of wood-cement compositions and decision-making algorithm;
- finding the reasons restricting the successful sales of wood-cement composition materials;
- determining the set of activities for market promotion of the wood-cement compositions.

At present the market of individual low-rise housing, light foam concretes are competing in this segment, develops in 2 directions. The 1st direction can be described as an individual contractor (B2C segment), aiming as a rule the construction of an individual housing project, private or summer house, garage.

2. Consumers segment- an individual contractor

It is quite difficult to forecast the moment of paying demand emergence and individual contractor motivation while choosing and purchasing of the precise type of construction materials, as every potential individual contractor is characterized by personal qualities formed in the process of education, bringing-up, personal experience, and belonging to the social level. The mentality development, individual contractor preferences are influenced by the information field available to comprehend and consume. Television, internet, telephones are the contemporary sources of...
information transport. The contractor activities algorithm consists of several conscious or non-conscious stages [1]:

- The stage of primary information. The person gets the primary information while looking through the magazine, watching TV programme or listening to the radio programme. The process of informing can be built in 2 mutually opposite directions. The plot of TV programme can describe the celebrity person life the rating of whom is the basis of format, timing and the story length. Precise construction materials, designs will be promoted in a hidden way (product placement technology) by means of a soft recommendation of an actor or a politician. While implementing of the 2nd direction the aggressive advertisement of the construction material or technology will be made. The person’s mentality and comprehension make it possible to watch the 1st format programmes for 30-40 minutes and even more. But a person will change the channel or close the browser tab after 40-60 seconds of aggressive advertisement watch.

- The stage of search of information. While searching the information the individual contractor uses the accessible means according to the personal characteristics of comprehension, motivation factors, age, and life style. At this stage the manufacturer has to supply the consumer with the full and understandable information of competitive benefits of the material, product or technology offered. The age, financial status and the life style of the consumer should be taken into consideration. For example, the quick loading/unloading, delivery of the materials can be determinant for the contractors of the active labour segment occupied at full-time job. And the main and motivating factor for the people of retirement age will be the accessibility of information by means of traditional mass media – newspapers, announcements, etc.

- The stage of options comparison and decision-making. While making a decision on construction materials purchase an individual contractor uses the information from advertisement websites, brochures, TV. The way the information is given is very important for great amount of technical information or subjective evaluation can cause the negative effect in decision-making. The bonus effect as well as an attractive price, for instance, of 1 m² of the wall without decoration, etc. are also effective. This is the way the information is given in the favourable light even if the material characteristics are not the main operational ones.

- The stage of purchase and consumption. The implementation of this stage is resulted from the previous one that is why the marketing technologies will be similar. The consumption in the individual contractor segment often goes beyond the recommended technology and targeted use of the material specified by the manufacturer. For instance, the use of the construction material in subnormal moisture conditions, wind load, insolation can cause its quick destruction and consumer’s discontent. And a discontent consumer will inevitably give negative comments, posts in social nets, forums and will influence the future sales in a negative way.

- The stage of service. Knowing the life cycle of the traded material and the contacts of the individual contractor the manufacturer can and should offer the optional service functions aiming to maintain the operating characteristics and to attach the new properties to the traded material. For instance, knowing the expiry date of the coating materials the manufacturer has to address the consumer and offer him the bonus programme of the materials suiting the earlier purchased goods.

3. Consumers segment- a professional contractor

The main characters who make decisions in the field of the professional building are executives and top managers of the construction companies. The direct decisions are made by the sales managers and heads of the logistics support departments. The important decisions on the innovative materials and technologies are made after the comprehensive analysis of the market for the B2B market [1] significantly differs from B2C, where the precise individual contractor-the house owner is of total responsibility of the wrong decision. In case of the wrong decisions in B2B market the whole division or even company is risky of insolvency. The task of the executive is to conduct the comprehensive analysis of precise situations aiming the support on maximum possible factors. The fewer factors are considered the less accuracy is in investments efficiency forecasting [2]. Personal and social responsibilities for the result of the decisions made complicate the task of the executive.
Nowadays marketing in the construction business becomes an important part of the increasing of the construction enterprise competitiveness all over the world. [3]

Due to the fact that companies – professional contractors consume a greater part of the materials, the manufacturers are of maximum interest in personal contacts with executives who make management decisions. The manufacturing companies are ready to support the individual interact with major contractors, the issue of the products nomenclature for the precise major customer.

The analysis of the technical and creative solutions of the construction site to ensure the comparability of alternative variants of management decision includes:
- the conditions and work schedules of the competitive goods manufacturer;
- the type, scales and maturity degree of the analyzed materials and goods production (small-scale, serial, full-scale);
- technological, construction peculiarities of produced goods (mass, thermal conductivity, moisture resistance, easy transportation, etc.);
- organizational value and technical merit of the manufacturer production (automation degree, quality certificates, quality management system, conditions of employment, etc.)
- image, reputation, culture of manufacturing company production;
- geographical situation, transport remoteness, existence of sustainable logistics linkages between raw sources and material production.

When choosing the strategy of management decisions the following aspects are analyzed: production conditions, competitiveness, financial risks, demand constraints and existence of production capacities, range of products, pricing policy, assets utilization, tendencies in construction market, raw materials accessibility and cost, economic and political aspects. Every precise case of a purchase decision making or investment needs a comprehensive analysis based on the marketing management principles in the field of construction, i.e. the process of company activity adjustment to the contemporary market conditions. The process consists of the key stages implementation: market research; market sampling; developing of marketing mix; implementing of the scheduled measures [4, 5].

Thus, successful promotion in the construction materials market in B2B and B2C segments demands from the manufactures of the wood-cement compositions the solution of a set of tasks, beginning with production and technology tasks and ending with the corporate positioning and forming of a new mentality attitude.

The questions of corporate positioning in the construction materials and technologies market is a key element of successful marketing and management. Material or product positioning is the parameters of the material or product perception by the individual contractor or construction company. At present there are 2 fundamentally different material positioning ways. The 1st allows positioning of the material as a competitor to the products existing in the market. The 2nd implies the developing of a brand new product or technology. It is more complicated, but in case of successful execution it enables a significant benefitting and sustainable occupying of the newly made niche in the construction materials market. The 1st way is of high risk either for it is difficult to conduct a competitive struggle with products or technologies already occupied their places in the market. Producing a common product (a building block, e.g.) on the initial stage the manufacturer decreases the expenses on the research and elaboration in the field of a brand new product, that becomes significantly valuable for the manufacturer and exposes an essential flaw for the consumers and the economics as a whole. Most companies usually take the 1st way. So, most manufacturers of the wood-cement compositions followed the rules and started the production of the traditional blocks and panels.

At first the technology of the wood-cement compositions production attracts greatly. Producing the construction materials for regions developers (construction industry, e.g.) is especially promising [6]. It will be a final product constituting milled wood particles joint by different binding agents. The feedstock can be produced from the wood wastes which are of large amounts at logging, sawmilling and wood processing industry functioning. These wastes reach substantial amounts. The volume of the logged wood in the Russian Federation in 2016 was 214 million m³ and the volume of wastes constituted about 32 million m³ [7]. Thus a wood-cement composition is a product of processing of sawmilling production wastes. The concept of full and integrated use of wood feedstock is declared in
numerous development programmes and strategies. But does it meet a mental support of the final consumer?

We conducted an experimental research in the form of a questionnaire to assess the sustainability of the construction materials based on the wood-cement compositions. 329 respondents aging from 23 to 52 participated in the questionnaire. 63% are university students, 21% - officials, 16% - workers. The form of a questionnaire implies the multiple-choice questions. 76% of the respondents answered they would potentially build or purchase a private house for permanent living. Ownership of a property has a deep positive impact on health, forms a social behavior, satisfaction and general well-being [8]. The questionnaire participants chose the following key criteria for desired construction materials: construction materials durability (62%), high esthetics factors (14%), factors of thermal efficiency and preservation (9%), possibility of step-by-step building and living in an uncompleted house (7%), low cost of the construction materials (6%), other demands (2%). 96% of the respondents announced positive attitude to the concept of full utilization of resources with the subsequent regenerating and processing. But only 7% of the respondents agreed to apply such materials in the construction of their house. Thus, the vital requirement for the materials was their “novelty”. In this regard the positioning of the wood-cement composition as a product based on the sawmilling wastes is fundamentally wrong and causes a negative perception of the product by the consumer.

Generally, the consumer comprehends that the application of wooden filler allows obtaining the wall constructions with high thermal insulation characteristics. Thermal and technical characteristics of the materials are inversely proportional to their volume weight and that is why light and extra light concretes are becoming increasingly important. They can be used both as thermal insulation and constructional load-bearing material for walls [9]. Wooden filler compositions should be related to aerated light concretes. Analyzing the competitor products of the similar application we can distinguish aerated and foam concretes, gas silicates. These are also the construction materials for the low-rise individual housing based on cement, sand, aluminum powder, gypsum, bleach, as well as on the industrial wastes such as lime and slags of metallurgy [10]. However, the manufacturers of aerated and foam concretes don’t mention about the industrial wastes component in them while promoting and advertising. Russian contractors prefer to use such construction materials as brick, concrete, steel. Natural materials and recycled materials especially seem less applicable. Such a tendency of intensive environment management, ignoring of the integrated utilization and regeneration is typical for “developing” countries [11].

Within the dynamic development of aerated and foam concretes production there is still insufficient attention paid to the wood-cement compositions production that looks quite strange. The number of Russian enterprises producing aerated concrete exceeded 70 units, with an estimated total production of more than 16 million m³ per year [12]. As forecasted [12, 13] the production of autoclaved cellular concrete in 2020 will reach 15 million m³ and 8.1 million m³ of non-autoclaved cellular concrete. In terms of square meters of total area it will constitute 36.16 million m² or 25% of the total housing commissioning. All the enterprises producing the cellular concretes are 10-15 years old. The largest enterprises of the Russian Federation produce more than 100 thousand m³ products per year. The less productivity plants also operate. The “Agency of construction information” reports there are more than 150 large and small enterprises on aerated and foam concretes production in Russia [14]. The data regarding the number and production volumes of the wood-cement compositions are fragmentary and imprecise. Announced production volumes of the enterprises (Arbolit 33, Timfort, Sibar) don’t exceed 100 thousand m³ per year. In comparison with 16 million m³ of aerated concrete it is a drop in a bucket. In general, we can say that the manufacturers of the wood-cement composition material operate in a format of individual contractors, enthusiastic persons, experimenters of B2B segment and cannot claim on developing of vast B2B market of construction materials for low-rise housing. At the current pricing of 60…70$ per 1 m³ of aerated concrete and 80…90 $ per 1 m³ of wood-cement composition materials the effective price competition of these materials is neither possible nowadays.

Since the wastes utilization issues are of special concern of both a precise manufacturer and the state on the whole the world has legislative basis examples of integrated wastes utilizing and processing. The system of grants, favorable tax treatment and direct legislative restriction is being
applied. There is an established practice in European Union to favour the thermal energy industry on the ground of wooden biomass use over the ordinary industries of wooden wastes use [15]. The similar practice exists in the USA [16]. Unfortunately, such initiative in the field of effective wastes utilizing and processing didn’t find practical use in Russia.

4. Conclusion
1. At present the materials based on the wood-cement compositions haven’t become an effective product of B2B segment of construction materials market of low-rise housing. The production volumes of these materials are negligible as compared to aerated and foam concretes which are sustainably established in the corporate B2B segment of consumption.

2. It has been found that negative attitude to the material as to a utilization product (i.e. produced from wastes) is an important issue decreasing the competitive advantages of wood-cement compositions as compared to another light concretes. This constraint subjective perception of the participants of B2B market segment is due to the immature comprehension of the importance and significance of wastes utilizing and processing.

3. The practical impossibility of pricing competition of wood-cement compositions as compared to aerated and foam concretes. Effective promotion of wood-cement compositions can be feasible with legislative support of the productions based on the use of biologically renewable raw materials and wastes processing.

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