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Evolution of the Business Models of Russian Construction Companies Digitalization of the Industry

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Development of the first business models of companies and the sectoral business system of the construction sector in Russia began 10 years after the country's transition to market economy and was of evolutionary nature. The purpose of the study is to identify the relations between business models of large construction companies and their ability to adopt and apply digital technologies and non-technological innovations. Today, only the largest construction and development companies are capable of purposefully shaping and developing their business models. The share of such companies in Russia is less than 1 %, but their role in the development of the industry is large. Most companies are listed in national and regional ratings, which opens access to the information about their history and development, geography of presence, strategies, experience in overcoming crises, etc. The head offices of these companies are mainly located in Moscow and St. Petersburg, and sometimes in million-plus cities. Research methodology included compilation of a non-representative sample of 50 construction and development companies, identification of four types of business models and analysis of the models on the basis of the collected information. In the construction industry of Russia, business models of large companies evolve from incomplete to complete construction cycle, then to complete development cycle with and without the building contractor function. A significant share of development companies retains the building contractor functions, and it is a distinctive feature of their activity in Russia associated with the high uncertainty of economy. Complete cycle developers show great interest in digital technologies and organizational innovations, but their inclination to digital technologies reduces interest in non-technological innovations and vice versa. The business model of the complete construction cycle gives the companies a weaker impetus for innovation.

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Subject. In many countries, including Russia, construction is known as one of the most conservative and slow-response industries with a relatively low efficiency and productivity of labour (Suprun, Stewart, 2015); and the least developed of its segments is housing construction. Little interest of construction companies for digital high technologies and innovative construction materials is usually explained by the isolation of the construction industry segments (housing, industrial, commercial, municipal, infrastructural, road construction) from each other, their independence and little interconnection between them. According to the latest assessments (Hampson et al., 2014), during the last 50 years global construction industry has been implementing high technologies twice slower than any other industries. The fundamental reasons of the low construction process organization efficiency are its dependence on the short-term interests and objectives of its parties, segmentation of the industry, business models of the companies founded on short-term objectives, traditionally static procurement contracts, low investment into R&D, inefficient communication. All these cause the waste of time, low construction quality, conflicts between the interested parties, low knowledge and technology transmission rate between the parties (Akintoye et al., 2014). The recognized root cause of the general inefficiency of the industry (Nambisan, 2017; Hardin, McCool 2015) is disorganization and lack of communication between the supply chain parties. Today these problems are also current in the construction industry of Russia.

The object of the current study is comprised of the large and major Russian construction companies; **the subject matter** is the business models of these companies. The share of such companies in the total number is not large; the examples are few, but their pioneering role in the industry development is enormous. Business model of a company is understood as a business organization method practiced in the industry (Kravchenko, Kuznetsova et al., 2010; Markova, Aleschenko; 2010). In construction industry, business models of different companies are assessed by completeness of their construction or development cycle: only large and major companies are capable of

shaping and developing their own business models. This is the reason why the present research is not based on small or medium-sized, but on large construction companies: they are the only ones capable of creating their own business models. The size of the company also influences the accessibility of information required for identification and classification of their business models. Such information can be found only for the top-rated companies at the regional or national level, which are, as a rule, companies of large size.

Moreover, identification of the business models of medium-sized, small and even large companies can be a challenging or even impossible task. It is proven by the study of Finnish construction companies (Pekuri, Pekuri et al., 2013). The study based on structured interviews with the top-management of the companies was intended to reveal the business models of the selected construction companies (of various sizes and specializing in various kinds of construction activities) and to generate an idea of how their management understand the business model concepts and which business models they select for their companies. It showed that the company management understand a business model very differently from the way it is understood in other industries and the way it is theoretically supposed to be. In construction, business models are often related to the activities of the company, i.e. they are rather understood as operating philosophy of the company concerning supply and delivery of a construction project than as product utility creation strategy. The same conclusion is confirmed by other publications (Johnson et al., 2008; Linder, Cantrell, 2000).

Objective of the research is to reveal the relation between the interest of the major construction and development companies for the adoption and implementation of digital technologies and their business models. What is primary: does interest for digitalization evoke the changes in the business model or is that the business model of a company that generates its interest for digital technologies?

Historical overview of Russian construction industry. The construction industry of Russia collapsed in the early 1990-s together with the centralized control system. For almost 10 years there had hardly been any construction in the country; in the early 2000-s, the industry came back to life with the global energy commodities price drop, which gave an impetus to the long and hard transition to the market relations. Housing construction began to revive and develop on the market basis gradually, starting from the two capitals and spreading slowly to the large regional centres. For the first time in the decade, the growing income of the population enabled them to open up the long-withheld effective demand for housing, which activated the secondary housing

market and later accelerated the development of the primary market as well. At first, the construction companies kept "stamping" standard blocks of apartments based on the Soviet projects; the demand for apartments exceeded the supply, the companies raised the prices, which stimulated the construction profitability and facilitated fast growth of construction companies in the housing market.

Around the mid-2000-s, competition between building contractors became more intense, and after 2005 a series of major changes occurred in the housing estate construction:

– protests against infill construction in large cities forced the authorities to cut down its scale, though it is not officially prohibited yet;

– demand for housing became differentiated; competition for buyers between construction companies has intensified;

– in large cities, construction companies built "customized" blocks of apartments and housing complexes based on individual projects instead of standard ones.

All these forced the construction companies to transform their businesses. Construction of apartment blocks based on individual and original projects is much more difficult and expensive than streamlined construction of standard five- and nine-floor blocks that are currently losing their popularity. In the primary housing market, competition for buyers between the companies is getting more intense: the demand for housing has become differentiated, i.e. the buyers are ready to pay more for spacious and comfortable apartments. Construction of customized housing required the companies to introduce significant changes into their businesses: they had to establish their own design subdivisions or outsource projects from other architectural and design bureaus.

By that time, construction companies of the developed countries had adopted and learned to successfully implement the digital technologies that were not considered as innovative anymore. Those technologies cover almost all key stages of real estate development (Table 1), enabling the construction and development companies to boost the value of their product for the customers and to cut down expenses, at the same time generating sources of competitive advantage (Porter, 1995; Osterwalder, Pigneur, 2009; Jensson, 2017).

The interest for digital technologies arose in large Russian companies by late 2000-s due to the opportunity of using them at almost all development stages to differentiate the final product and to add value for the customers. As the technologies are adopted and as more experience is accumulated, the companies succeed to "stretch them" to the stages of sales, corporate management and construction. At the present moment there

are few Russian companies at the BIM-technology adoption stage. The scope of the technology is wide – it is used to implement the entire functional capacity of the project throughout all development cycle stages within one integrated digital information environment: to control the material expenses, to analyse planning solutions and mitigate the risks by continuously receiving data from the monitoring taskforce and the construction control division. This is an expensive technology affordable for just several companies in Russia, but, nevertheless, since 2018 in Moscow the use of such technology i.e. the presence of a BIM-project has become a mandatory condition for building any facility including housing.

Table 1. Digital technologies application potential at the key development stages

Development stages	Technology implementation opportunities
Site selection	GIS-technologies, georeferencing
Site preparation	Construction site digitalization
Design	BIM* design technologies
Construction (construction and assembly operations)	Online application of the big data-based information technologies for optimization of technological process. Robotization, sharing model of construction machinery operation
Territory improvement	GIS and BIM technologies
Real estate sales	Market analysis with BI software. 3D site models, augmented reality software (glasses), analysis data accumulation
Corporate management	Based on BIM site model
Real estate operation and management	Using sensors for real estate management and "smart" house development

* BIM – Building Information Model.

In the near future, companies will be able to apply digital technologies at the real estate sales stage in the spheres of marketing, advertising and market analysis. Analysis of big data on the previous advertising campaigns combined with CRM[1] system enables companies to calculate the output of every Rouble of the advertising expenses and to make up the buyer portrait for every project. In Moscow, housing sales are facilitated by visualization: a 3D model and augmented reality glasses allow the potential buyer to take a look at the apartment from inside, take a virtual tour around it. Some companies monitor the market changes in real time and accumulate information for future processing and analysis of the market situation and competition level in order to perform an efficient investment analysis upon entering the project and in the process

[1] CRM system of a company – Customer Relations Management.

of sales. In corporate management, big data technologies open new opportunities for estimation of costs, calendar planning and forecasting. The use of digital technologies opens new prospects in real estate management and building operation. Receiving IIC[1] information from various sensors and monitoring gauges, management companies will be able to turn the buildings into "smart" structures to control their condition (RBC, 2017).

In summer 2017, the Government of the Russian Federation approved the "Digital Economy of the Russian Federation" Programme (Programma, 2017). One of its basic purposes is to coordinate the disjointed efforts of various industries for digital technology development. Construction industry welcomed the Programme with great enthusiasm. The Programme outlined the main trends in the development of digital economy that also concern the construction industry: legal regulation, HR and training, establishment of research competences and technical groundwork, information infrastructure and informational security. The Ministry of Construction of the Russian Federation developed the Roadmap of the Construction Programme, but it did not cover three important aspects: designer and manager training and research competence development, as well as information security. Moreover, a sequence error was made: BIM Roadmap prescribed the development of national information modelling standards, while the list of such standards had not yet been determined. Due to these mismatches construction industry was left outside the Programme and delayed, though did not stop the general process (Korol, 2017).

Research methodology. To achieve the objective, a sample of 50 largest and major Russian companies was made. For the majority of the sampled companies, the head offices were located in Moscow and Saint Petersburg and for several of them, in million-plus cities. Doubtlessly, this sampling is non representative, but it is enough to demonstrate the main tendencies in the industry development and the trends of the large companies' business model building. The accumulated information covers the history of creation and development of the companies, their age, geography of presence, preferred strategies, presence in the domestic and international stock markets, crisis management experience etc. It facilitated both identification of the business models and classification of the companies by types and determination of the main evolution tendencies.

[1] IIC–$5ntegrated Information Centre.

Among the 50 sampled companies, 39 are from Moscow, 6 are from Saint Petersburg and 5 are from Siberia; this proportion is close to reality, as in the past decade the largest-scale construction was observed in Moscow, the second largest was in Saint Petersburg and in the regions there was less. The sampling included operating companies, the ones that have already gone bankrupt (Mitax Group and SU-155 Group from Moscow, and Mostovik from Omsk), and the companies taken over with the loss of brand (SibAcademStroy from Novosibirsk taken over by Brusnika from Tyumen).

Research results. The analysis of the development histories and strategies of the sampled companies helped the authors to determine the main stages and methods of business management, to identify the business models and to classify them by type and determine their development tendencies (Fig. 1).

Business models of the sampled companies went through several transformation stages: from incomplete to complete construction cycle, and then to complete development cycle with the building contractor function and without such.

The sampling did not include any companies with incomplete construction cycle, though there is no doubt that the majority of old large companies began their activity from this business model (Table 2). The objective of such companies is obvious: to achieve the arrangement of a complete construction cycle. It was partially achieved through takeovers and mergers with the construction material or raw material producing companies; doing so, a company grows fast, expands its geography and restricts its dependence on its suppliers.

In the highly uncertain Russian economy, fluctuation of supply and demand, rise and fall of the real estate prices, the risks of the long investment cycle project grow higher; for this reason, the developers do not hurry to give up the building contractor function, retaining the capital-intensive construction assets on their balance and

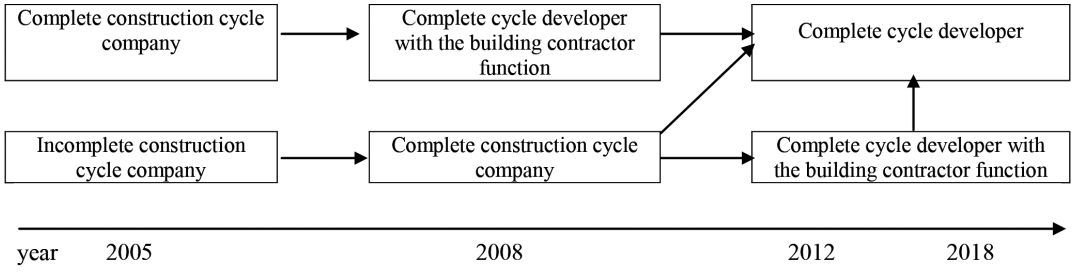

Fig. 1. Development trends and tendencies of the business models of Russian construction companies

keeping the professional building staff, fearing dependence on the external contractors and taking the opportunity to make buildings under the contractor agreement for other companies, including complete cycle development companies.

Table 2. Distribution of sampled companies by business model types

Companies with complete						Construction companies			
developer cycle			developer cycle with building contractor function			with complete construction cycle			with incomplete construction cycle
Moscow	St. Petersburg	Siberia	Moscow	St. Petersburg	Siberia	Moscow	St. Petersburg	Siberia	0
17	2	1	11	1	1	11	3	3	0
Total – 20			Total – 13			Total – 17			Total – 0

The same strategy was adopted by one of the major Russian construction companies, SU-155 Group founded in Moscow in 1954. It went through the Perestroika, the collapse and suspension of construction; in 1993, it got transformed into SU-155 JSC and began to develop its complete construction cycle. In 20 years, a relatively small construction company evolved into a closed-circuit operating group of industrial and construction companies. The assets of its business structure ensured integration of all stages of its technological chain. In 12 cities of the country, including both capitals with the regions and Federal Districts, it owned a number of building contractors; in Moscow alone, it had over twenty. The Group also included five machine engineering plants, 22 building contractor organizations, 30 construction material producers scattered around the regions of Russia. Moreover, the Group also encompassed customer and designer companies, two transport companies from Moscow and its own financial sector. The Company dealt with building industrial, housing, social and religious facilities, manufacturing of building cranes, non-metallic construction materials; it invested in land, engineering infrastructure and utilities, had connections with the governmental authorities, for instance, constructed military housing quarters under an agreement with the Ministry of Defence of the Russian Federation.

During the crisis of 2008–09, having lost the budget financing, SU-155 began to miss the commissioning deadlines, delay the move-in of co-investor residents and apartment property title formalities, failed connection of the occupied apartments to

hot and cold-water supply. In 2011–12, all these issues created social tension in Moscow and the region. After 2014, the state abruptly cut down the advanced payment for the construction; the company was forced to take loans, but was incapable of maintaining and repaying them, which resulted in missing more commissioning deadlines; finally, in April 2016, SU-155 was declared bankrupt. The complete construction cycle was not a solution: the ceased budget financing, the absence of state-guaranteed orders and enormous material assets of the company caused the bankruptcy. Overburdened with assets but deprived of financial support from the government, it failed to manage itself.

The complete construction cycle business model was identified in 17 of the sampled companies, with 14 of them being "old" companies established before 2000, i.e. for the major part of their lives they had been functioning in the centralized control environment. The economic purpose of such a model is to maximize the profit from the constructed building sale. This is the model that happened to be the most popular among complete cycle construction companies during the global oil and gas price growth period (2000-s), as it accelerated the pace of construction. After 2014, the same business model caused bankruptcy and takeover of 5 out of the 15 long-living companies (3 companies from Moscow and 2 Siberian infrastructural companies).

The majority of sampled companies (33 of 50) are represented by developers; 20 of them preferred the complete development cycle business model, and 13 of them also retained the building contractor function along with development. The economic purpose of this business model is to maximize the market value of the constructed houses. To focus on the development stages that increase the added and market value of the houses, the companies had to radically cut their assets. First of all, they reduced their most capital-intensive assets by selling or alienating their construction and decoration material producing companies; or they do not produce, they just procure.

But after, the strategies and business models of such companies diverged: the developers with the building contractor function chose to keep the building capacity, while the "pure" developers gave it up, preferring to maintain and strengthen their architectural and design subdivisions. The building works for them are carried out by external companies under a contractor agreement.

As a rule, in the developed economies, the complete cycle developers do not build themselves, focusing on the key development stages that make up the value chain for the customer, increase the product differentiation and acquire new competitive advantages. The capacity of building the value chain at the key construction cycle stages mostly develop on different business models and underlying economic objectives

of the companies, as the building contractor function may weaken the interest of the company for digital technology implementation (Table 3).

Table 3. Capacity of value chain generation of the complete construction and development cycle companies

Complete cycle stages	Complete construction cycle company	Complete development cycle company using BIM technology	Comments
Site selection	Selection criteria: proximity of infrastructure, area, price	Selection of a nice site, considering the terrain and landscape	Developer takes terrain and landscape into consideration
Site purchase	Site purchase	Site purchase	No difference
Site preparation	Preparation of the site for construction	Digitalization of the site, identification of its special features to be considered during the house design	Developer increases the future market value of the complete house, using BIM technology to match it to the terrain and landscape of the area
Construction design	Project developed by an internal design subdivision or an external design company	Design subdivision of the company develops the project (BIM), taking the terrain and landscape into consideration	
Preparation for construction	Production of the required construction materials and accessories with the company's own effort	Conclusion of the construction contractor agreement; control over the procurement of the construction materials and accessories by the contractor	Construction company avoids dependence on the material suppliers, but bears large expenses on the asset maintenance
Construction (construction and assembly works)	Construction of the house by the company's own effort	The house is built by the contractor working under the agreement	Developer mitigates the risks selecting the contractor and controlling the procurement
Improvement of territory	Improvement of the adjacent territory and the yard	Building contractor is in charge of improvement of the adjacent territory and the yard	Same result
Constructed real estate sale	Sales are possible after the underground phase; housing is sold with discount under CIA*	Full market price sales begin only after commissioning of the house	Construction company may use the sale revenue at the construction stage
Corporate management	Commissioning	Commissioning	No difference
Operation and management	No actions	Some rooms on the ground floor and unsold apartments remain as property of the company managed by it	Developer may receive additional income from possession of the real estate with growing price

CIA* – Co-Investment Agreement.

The income of a complete construction cycle company is created due to the savings on expenses (economy of scale); customer value chain is not created, as the product is not differentiated, but since the demand is high, everything can be sold (before 2010). The developer understands that the implementation of digital technologies in

challenging sites with interesting terrain and landscape will increase the construction costs but satisfy the differentiated demand of the customer, creating the value worth paying a high price, a part of which will be received by the developer as revenue.

A complete construction cycle company and a development company with the building contractor function bear large expenses on the maintenance of their own design subdivision, construction facilities, and professional construction staff, which reduces their interest for the digital technologies. Construction of a unique building based on an original project is hard for a company with complete construction cycle; digital technologies are too expensive for it. As developers with the building contractor function have no design subdivisions, they turn to external design workshops which also entails great expenses. Constructing a building, these companies count for the design and project expenses to repay at the construction stage. But it does not always happen: it is never cheap to make a unique building based on an original project. This is why such companies prefer building business-class housing that is easier to sell. Complete cycle developers normally do not engage themselves in building, but they are serious about the selection of a contractor and keep all the construction stages under a strict control.

Until recently, Russian complete construction cycle companies could sell building apartments under the co-investment agreement (CIA) with a discount after the completion of the underground phase construction. Very often it entailed the situation when the funds earned from the sales of incomplete apartments were invested to launch a new project. It caused missed deadlines of the pending projects, and the buyers who had paid the full apartment price could not move in on time. Today such practice is prohibited by law; there is a new equity holder cooperation model known as project financing. However, complete cycle developers do not fall into this trap, since they begin the sales only after the house is commissioned, and launch their projects only using their own or borrowed funds. Complete construction cycle companies do not deal with real estate operation and management. Complete cycle developers, including those with the building contractor function, manage the unsold estate purposefully left in their possession, which may bring an additional revenue and also facilitate the growth of such real estate price.

But let us return to the question on the influence of the business model on the construction company's capacity and interest for technological and other innovations. Table 4 gathers and classifies the sampled companies that create non-technological innovations. The analysis did not reveal any high interest for non-technological

innovations. Some interest for organizational innovations was shown by seven companies, all of which are located in Moscow. Five of them are complete cycle developers, one is a developer with the building contractor function and one is a complete cycle construction company. All of the companies demonstrate innovations of different types: renovation and further administration of historical buildings, re-development of a territory, innovative construction and decoration materials production, organization and management innovations. All that proves the desire of the companies to differentiate their product without getting any digital technologies involved.

Table 4. Innovative activity of the sampled companies (by business model types)

Complete development cycle	Complete development cycle with the building contractor function	Complete construction cycle
Five Moscow companies. – New real estate market segment development: Vesper JSC, Shater Development, KP Properties CJSC renovate and manage historical buildings and cultural heritage objects. These companies apply innovative architectural solutions, new construction and decoration materials. Glincom company deals with territory re-development (improvement of quality and increasing the real estate market value). – Organization and management innovation in the sphere of housing estate operation and management. City 21 Century Company introduced a new product and brand Minipolis, a comfortable environment, development territory and lifestyle	Leader FCC (Moscow) Organization and management innovation in the sphere of housing estate operation and management. Service 24 Management Company supplies day-to-day service to the newly built UP-quarters. The residents of the Quarters enjoy the 'Up-365 Personal Assistant' service: babysitting, cleaning, grocery delivery, car rental, dry cleaning etc.	KROST Concern (Moscow) Innovative construction and decoration material development and production. KROST is the first Russian manufacture of architectural concrete and a number of other innovative construction materials

Table 5 presents the sampled companies that adopted various digital technologies at different development stages. There are eight of them (six companies from Moscow and two from Saint Petersburg); distribution between business model types is uneven. The most advanced companies with different business models (Etalon Invest, PIK GC and Self Group) have adopted and started to implement digital technologies at two development stages.

Thus far, the most popular technology is BIM, applied at two development stages. It is being adopted and implemented by two complete cycle development companies, two development companies with the building contractor function, and one complete cycle construction company. Etalon Invest does not only apply BIM technologies at the design stage; it uses big data digital technologies for the launch and expansion of the CRM to its ecosystem, at the same time arranging partnership with the service suppliers, including big data operators.

Table 5. Sampled companies' activity in the adoption and implementation of digital technologies (by business model types and development stages)

Stages	Technologies	Companies		
		developers		Complete construction cycle
		Complete cycle	Complete cycle with building contractor function	
Site preparation Project and design	BIM technology Site digitalization and site model generation (former telephone station buildings); Creation of the information model for Scandinavia housing complex fit into the site landscape; Specification of all project works; Integration of BIM with the development process automatic control system		Leader Invest	
		Etalon Invest		A101 Group
		SMINEX		
			Selt Group	
Preparation for construction (construction and assembly works) Site improvement	Big data technologies Creation of the data processing centre; development of a distributed IT subdivision network. Comprehensive digitalization of all site work patterns, root change of the workers communication system, cutting down the intermediaries between the management and the contractor			PIK Group
Real estate sales	Big data technologies In the sphere of marketing, advertising and market analysis; Buyer and product portrait generation; pricing policy optimization		«INGRAD»	PIK Group
Corporate management	Big data technologies Optimization of the construction process and enhancing safety at the construction site	Etalon Invest		
	Implementation of a CRM system and expansion to the company ecosystem to arrange partnership with service suppliers, including big data operators	Capital Group		
	Integration of BIM with the development process automatic control system at all stages and in all aspects		Selt Group	
		3	3	2

SMINEX uses BIM technology to design and implement the most efficient IT solutions. Leader Invest, specializing on renovation and comprehensive development of old industrial zones, digitalized former telephone station zones to fit the project into the new landscape. A101 CG implements BIM technology in the anchor construction project of Scandinavia brand housing complex: the tests were made on the created information model, reducing the documentation development time by 30 % and the number of errors by 80 %. The company uses BIM to design a number of housing

estates and creates its own template and family library based on Revit software products[1]. Selt Group company from Saint Petersburg integrated digital modelling with the automated investment control system to monitor the development process at different stages and in all possible aspects, from the cost of planning solutions and materials to risk management.

The largest Moscow group of companies, PIK, which had a narrow escape from bankruptcy in 2016, recently changed its investors; it is the most advanced construction and assembly company in the digital technology operation. It has already created a data processing information centre, developed a distributed IT subdivision network. Collecting data from its contractors, it digitalizes its working patterns at the construction site on a weekly basis to change its worker communication system, to reduce the number of intermediaries between managers and contractors. As a result, the communication chain becomes transparent and synchronized with the construction materials supply planning system. To ensure continuous collection of data from the construction site, the company is planning to provide all of its workers with smart bracelets to register the duration of their activity, movement around the site and physical load. In the sphere of marketing, advertising and market analysis, PIK GC with its complete construction cycle is the leader again. It applies the big data technologies: the entire consolidated database of information of the previous advertising campaign is integrated with the CRM system of the company and properly processed; the output is the efficiency assessment of each advertising campaign and the complete portraits of customers for each project. At the same time, the sales department monitors the market data in real time, analyses the market situation, competition level etc.

INGRAD Company uses digital technologies to forecast the market situation, advertising and marketing. BI software is used to analyse and visualize data on the concluded agreements, real estate market situation and the competition background. The information is processed in the aspects of costs, location, types etc. The same technology is used for the demand and claims analysis through the project website visiting data, through the review of the phone calls of the current and potential customers, data from the call centre and other automated systems, survey results. The analysis of these multiple information units makes up the portrait of the customer with

[1] Revit – conventional library of materials and structures, often used by Russian designers along with CAD software. However, BIM specialists often find mismatches of the structures and engineering communications in the models developed on the basis of this software.

its basic needs, generates the product and makes up the pricing policy. Capital Group Company launches and expands its CRM system to the Capital Living ecosystem to arrange partnership with its service suppliers, including big data operators.

Corporate project management was also taken up by the complete development company with the building contractor function, Selt Group from Saint Petersburg. It has integrated BIM with the automated investment control system over different stages of development and in all of its aspects. In the past several years, the trend for "smart buildings" has been established in Russia; real estate operation management is inclined to digitalization of the security systems and automation of buildings, integration of technologies, networks, scripts and connections.

Conclusions. Among the companies actively engaged in digital technology adoption, there is an equal number of "young" (established after 2000) and "old" companies (4+4); three of them are public. In the sampling, there are seven public companies. The companies that create non-technological innovations normally do not overlap with the companies that choose to explore and implement the new digital technologies. Perhaps, the interest for management innovations reduces the interest for digital technologies.

In general, 15 companies of the sampling demonstrate some innovative activity. The most active ones are complete cycle developers (5+3=8 companies); the second are developers with the building contractor function (1+3=4 companies); the least active ones are the companies with complete construction cycle (1+2=3 companies). However, the most advanced in the digital technology implementation is PIK GC, a complete construction cycle company.

These results speak to the inter-dependency between business models and digital technologies. Business models influence the inclination and tendency of the Russian construction companies to explore and implement some digital technologies. On the other hand, the digital technologies themselves expand the technological capacity of the companies so much, that it makes a significant difference for the entire business organization system and its operating activity. First of all, such an effect is caused by BIM technology, with is of greatest interest for the companies.

BIM is an extremely high technology that requires special qualification to operate; it is actively developing, attracting more and more actors, among whom, besides managers, directors, experts, designers, there are engineers, consultants, constructors, assemblers, suppliers, buyers and sellers. Everyone who gets involved in the system will react to the changes and seek for future opportunities and problems, and will

work to develop solutions. This technology forces a change on the entire business organization system, i.e. its impact on the business model of a company is beyond any doubt.

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Эволюция бизнес-моделей российских строительных компаний и цифровизация отрасли

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Развитие первых бизнес-моделей компаний и отраслевой бизнес-системы строительной сферы России началось спустя 10-летие после перехода страны к рыночной эко-

номике и носило эволюционный характер. Цель исследования – выявить связь между бизнес-моделями крупных строительных компаний и их способностью к освоению и применению цифровых технологий и нетехнологических инноваций. Сегодня лишь самые крупные строительные и девелоперские компании способны целенаправленно формировать и развивать свои бизнес-модели. Доля таких компаний в России менее 1 %, но их роль в развитии отрасли велика. Большинство компаний – участники общероссийских и региональных рейтингов, что открывает доступ к информации об их истории и развитии, географии присутствия, стратегиях, опыте преодоления кризисов и пр. Головные офисы этих компаний располагаются в основном в Москве и Санкт-Петербурге, незначительная часть – в городах-миллионниках.

Методология исследования: составлена выборка (нерепрезентативная) из 50 строительных и девелоперских компаний, на основе собранной информации выявлены 4 типа их бизнес-модели и проведен анализ.

В строительстве России бизнес-модели крупных компаний эволюционируют в направлении от неполного к полному строительному циклу, далее к полному циклу девелопмента с функцией застройщика и без нее. Значительная доля девелоперских компаний сохраняет функции застройщика – это особенность России, связанная с высокой неопределенностью экономики. Наиболее высокий интерес к цифровым технологиям и организационным инновациям проявляют девелоперы полного цикла, но их склонность к цифровым технологиям снижает интерес к нетехнологическим инновациям и наоборот. Бизнес-модель полного строительного цикла слабее стимулирует компании к инновациям.

Ключевые слова: бизнес-модель, отраслевая бизнес-система, стратегия компании в отрасли, полный и неполный строительные циклы, полный девелоперский цикл и девелоперский цикл с функцией застройщика, инновации и цифровые технологии в строительстве.

Научная специальность: 08.00.00 – экономические науки.