A Literature Review for Decision and Motivation Support System for Real Estate Consultants Based on Data Analytics Project

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Özet

Yöneticiler, çalışanlarından yüksek performans almak ve şirketin hedeflerine daha kolay ulaşmasını sağlayabilmek için çalışanların motivasyonunu yüksek tutmaya çalışır. Serbest çalışılan işlerde çalışanlar aynı zamanda kendilerinin işverenidir. Bu durum her ne kadar rahat gibi gözükse de, zamanın ayarlanması ve görevlerin organizasyonu açısından büyük bir sorumluluk getirmektedir. Emlak danışmanlığı da serbest çalışılan bir meslek olarak değerlendirilebilir. Gelirleri emlak alım satımına doğrudan bağlı olduğu için dolayısıyla motivasyonlarına da bağlıdır. Danışmanların günde birçok kez içinde bulunduğu karar verme sürecinin beraberinde getirdiği sorumluluk yükü ve stres, motivasyonlarının düşmesine neden olabilmektedir. Danışmanlar doğru kararlar verebilmek için tecrübelerinden, teknik pazar bilgilerinden ve çoğu zaman yeterli olmayan istatistiksel veri analizlerinden yararlanırlar. Bu sorunlara çözüm olarak motivasyonlarını arttırmak için oyunlaştırmayı, karar verme süreçlerini desteklemek için veri bilimini kullandığımız "Decision and Motivation Support System for Real Estate Consultants based on Data Analytics" projesi geliştirilecektir. Bu makale, motivasyonun genel tanımından itibaren motivasyonu etkileyen faktörleri incelemenin yanı sıra, özellikle emlak danışmanlarının günlük yaşamda zorlandıkları konulara değinip, günümüz bilgisayar teknolojilerinin bu tür sorunları nasıl ele aldığıyla ilgili bilgilendirip, çeşitli fikirler ve çözüm önerileri getirmeyi hedef almaktadır.

Abstract

Managers try to keep their employees' motivation high in order to improve the performance of them to achieve the goals of the company. In freelance jobs, employees are also their own employers. Although this seems as comfortable, it also has a tremendous responsibility including the arrangement of time and management of tasks. Real estate consulting could also be categorized as a freelance job, they earn when they sell or rent a real estate. The income of the consultant is directly connected with their sales so their motivation. The burden of responsibility and stress caused by the decision-making process which the consultants have many times a day can cause their motivation to decrease. To give accurate decisions consultants benefit from statistical data analysis which could be insufficient in some cases, their experience and technical market knowledge. As a solution to these problems, we will use gamification to increase their motivation and data science to support decision-making processes in "Decision and Motivation Support System for Real Estate Consultants based on Data Analytics" project. This article examines the factors that affect motivation starting from the general definition of motivation, as well as addressing the issues that real estate consultants face in their daily life, and informing about how these computer technologies handle such problems and proposing various ideas and solutions.

1. Introduction

Business motivation is the most important factor that allows employees to act according to their wishes and desires in the process of achieving the goals and objectives determined in business life. Another issue that employees challenge is the decision-making process because of the consequences of the decision. Real estate consultancy is one of the professional groups that experience this process. As a solution to these problems, project "Decision and Motivation Support System for Real Estate Consultants based on Data Analytics" will be used to encourage real estate consultants to advance their progress by supporting the continuous participation of people, along with the rewarding system and competition elements it brings with the gamification technique. In addition, the models created by data mining and data mining processes will allow individuals and businesses to make more effective decisions by improving their decision-making processes.

In this article, it is considered that the daily life issues and challenges that real estate consultants face. Since the world is keeping on expanding and developing, the count of the data also increases. Because of the difficulty of processing data, it is introduced as a new term "data science". As it is discussed below, the importance of data science and how data-driven applications work to help consultants for decision support and allow them to predict future trends. Besides, it is presented how the companies apply the game mechanics which is called "gamification" into their businesses to keep their target audience motivated.

2. Overview of Motivation

Motivation is a process in which individuals behave with their internally generated drive, desires and wishes to accomplish a specific goal [1]. The success of the companies depends on the efficient and effective use of manpower. Motivating an employee is the best way possible for manpower. Individuals who are satisfied with their jobs work more willingly and productively which effects the overall benefit of the organization as well as their creativity and commitment to their work increases [2].

It is also important to consider the theories behind the term "motivation". One of them is Maslow's Hierarchy of Needs [3]. It is known as a pyramid consisting of the chain of needs to meet for a person to be motivated. The point of this theory is in the hierarchy of needs, a person will want to perceive and meet the need for a higher level after meeting a lower level need. Another theory is Herzberg's Two-Factors theory which is affected by Maslow's theory and describes the factors to make people feel positive about their jobs [4]. He claimed that people's job satisfaction depends on 2 factors: motivation factors and hygiene factors. Motivation factors can be a success, the quality of the work done, recognition, appreciation. If people feel that their efforts are appreciated, they will feel compelled to continue working hard. Even a simple shared positive feedback like hand-written "Thank you" or "Good job" as a compliment may affect the employee. Meanwhile, hygiene factors are the contributors not as strong as motivators but since the job dissatisfaction is influenced by hygiene factors, they must be present. One of them could be salary. According to the Society for Human Resources Management, employees indicated that with the amount of 30% rise in their salary, they would drop off the current workplace and do the same job in another company [3]. So, the managers must think of especially a bonus or a rise in salary considered as a financial reward to encourage their employees to work harder and help them to face their daily life challenges. Besides that, since the workplace is the place that most of the employees spent their time with, managers must make sure that things are well-kept in order to please them.

Today's technology also has an impact to gather all the advice for employers or the ones who appear to be a leader. There are many mobile applications to drive employee engagement. One of them is Tap My Back which helps team members to recognize each other. The application also provides valuable information, insights and analytics of the team to team leader to allow him/her to contribute individual or team goals. "15Five" which focuses on feedback, peer to peer recognition with the "weekly check-in" for every employee. Another one is "Slack app" which is known as Facebook for the workplace. Employees are part of "channels" which can be utilized to share thoughts and brainstorm ideas. The idea is to help teams improve their communications to one platform to encourage the spirit of teamwork.

As declared, keeping the motivation high is an issue for most of the people. The people around an individual may help him/her but it is limited, thus most of the responsibility is upon the individual himself/herself. But today's technology helps people to make a clear action plan and the ability to sidestep negative thoughts in order to achieve their success with a mobile application. "Creative Visualization" is one of these applications that make people balance their life easier. It creates the process of consecutive visual mental images of the desired moment so that people can experience it with an intent which drives them to work harder to achieve. The other application to overcome mental health challenges is "Think Up" which allows users to select affirmations, record a voice that their brain truly trusts and add an image to inspire themselves. The last application to give as an example is "MotivateMe" which gives random motivation quotes and supports approximately 3000 minutes of audio coaching. It is claimed that "MotivateMe" is especially effective for business owners.

3. Challenges on Real Estate Consultants

Being a real estate consultant has too many challenges as in every profession. First of all, there is not any professional education for technical market information like a university education. In order to have comprehensive knowledge of the real estate market, there are courses and seminars that companies provide. Experience is another challenge that consultants face with, for self-improvement they need to do more sales practice. Moreover, having a wide network and specific personal skills like being a persuasive and extrovert person and having self-confident are key points of being a successful expert. Another difficulty in this profession is always being in an interaction with humans. Buyers and sellers may have no idea about the market and can disagree with the price of the real estate. Consultants have to know about the physical qualities of the real estate and market in this neighbourhood. With the help of this knowledge they have to guide the clients and after the persuasion and negotiation processes, a real estate is sold. With all of these problems, accepting a portfolio is also hard to decide. Although, they use web applications that provide real estate index and statistical information about the market in that neighbourhood while they are deciding there are insufficient for some decision-making processes.

Working as a real estate consultant is like freelance jobs. Even though they have to visit the office for some paperwork they do not need to go to the office at a certain hour of a day. Consultants do not receive a salary from an employer and do not have any due date or sale limit. They earn when they sell or rent a real estate. As a result, earning money is directly connected with the motivation of the consultant. Although working freelance has advantages, there are lots of disadvantages that cause loss of motivation. Structuring the time periods of a day is the main problem, procrastination is a common behaviour among freelancers. Being your own boss could

seem like a comfort but management of the whole process is a tremendous responsibility. In addition, the apprehension of sale cause stress and this may also decrease the motivation. To solve all these problems, consultants may set some sale goals to achieve in different time periods. Moreover, the competition between consultants may increase overall motivation. Management of goals and following of competitors could be implemented into a mobile application that consultants use in their daily life.

4. Gamification

Nowadays, employee satisfaction and motivation have gained more importance. So, the companies introduce the gamification to their business concepts [5]. Gamification integrates the game mechanics into a brand, a business or a specific product and creates an interactive environment. Gamification proved how successful it is to engage people to help them gain skills and solve problems with data-driven techniques. A study developed with the participation of 1021 technology stakeholders and critics by the Pew Research Center's Internet & American Life Project, supports the same idea: 53% of the respondents agreed that by 2020 "there will be significant advances in the adoption and use of gamification" [6].

We can see the influence of gamification in many large companies. For example, LinkedIn, the business-oriented network uses a little motivation statement in each progress bar to encourage the user to complete his/her profile. Besides, LinkedIn quotes that if a task assigned is completed, the user can get a job easier which strengthens the intrinsic motivation towards achieving the goal [2]. On the other hand, eBay, one of the biggest companies in the e-commerce field, has a bidding system that makes the buyers compete against each other. The buyer who gives the highest price claims the item. That is considered as an extrinsic motivation since it lies on an external factor such that a buyer is motivated by outbidding others [7]. From the company point of view, the purpose is to awaken customer's interest and keep in touch with it.

5. Mobile Applications in Real Estate Industry

The development of the technology provides the ease in reaching/using data. For instance, mobile applications. They are running on a small hand-held mobile device which is moveable, easy to use and accessible from anywhere and any place [8]. Therefore, mobile applications are important to help consultants in the real estate industry. According to a research, a mobile app for real estate industry is developed which is patented and which has a function as: The user begins with a region where they are interested in acquiring property and select an inner area within this region by using a pointing device such as a mouse to designate boundaries on a map displayed on screen. This is then zoomed in on and a second area is selected within the zoomed region. The second area is then cross-referenced with the database of available properties whose approximate locations are then pictorially displayed on the screen. Information about the properties can then be obtained in the textual form [9]. However, this is not the only usage of mobile apps in the real estate industry. In real estate industry consultants deal with lots of paperwork. Therefore, if it can be done via mobile phones, the time spent on road/workload is lightened for a consultant. These usages of mobile apps in the real estate industry are some kind of decision support system tool.

6. Decision Support Systems

According to research, every six months the database expands by more than 650,000 price offers (advertisements) on purchase or rent of flats, houses, commercial buildings and allotments. [10] The volume and variety of data have far outstripped the capacity of manual analysis, and in some cases have exceeded the capacity of conventional databases [11]. Therefore, data science, data mining and data-driven decision making became a thing since the since the internet was invented.

In the real estate industry, the most important thing is to sell the house rapidly and with a profit. However, the newcomers to the field lack information in order to determine the worth of a house. However, decision support systems are created to help people make decisions by providing access to information and analysis tools, it's a way to model data and make quality decisions based upon it [12]. Therefore, the newcomers can be more precise by getting decision support but a downside of the decision support is that if it's not done properly the decision support may lead to false value estimation which also leads to loss. Therefore, a properly-designed decision support system is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions [12]. There are enough data in order to help consultants in real estate. The decision support in real estate is required mostly after the process is begun such as exorbitance investment in real estate, the rapid rise of house price, the high vacancy ratio on, which require government and relative department to institute reasonable industry policies to channel off the industry development [13]. However, the decision support should be done on a trusted data rather than any data. Fortunately, there are lots of statistic data in the industry, such as the total dimension of investment, floor space started and finished in every year, space of house pre-selling by region, the average house price in a different region and so on [13]. One other must have a trait of the decision support in real estate is to focus on strategic decisions rather than operational one. More specifically, they should contribute to reducing the risk faced by managers when they need to make decisions regarding future options [12]. It is also important to minimize the risk of potential losses due to wrong decisions in real estate which can be prevented by the decision support system since the property managers face everyday critical risk management decisions. [12].

6.1 Data Science in Real Estate

Data science is a very broad topic. Therefore, in order for data science to serve business effectively, it is important (i) to understand its relationships to these other important and closely related concepts, and (ii) to begin to understand what are the fundamental principles underlying data science [11]. Therefore, a new occupation was invented because of it which is "Data Scientist". They use data mining and prepare reports to support companies which the action is also called data-driven decision making.

The data science in real estate not only helps the consultants but also to the entrepreneurs and government. It can help governing bodies and enterprises to get some useful information from the collected data. For example, the government can understand the status and development of the industry and institute some reasonable policies, and real estate developers can find commercial chance and customers to plan for some project as well as carry into execution [13]. Data mining is the most used method for data scientists to help real estate consultants.

6.2 Data Mining in Real Estate

Since the world is keeping on expanding and developing, the count of the data also increases. By 2020, every person in the world will create 1.7 MB of data every second [14]. Especially, data mining is a new concept that helps uncover hidden information like future trends, behaviors, and patterns stored in databases. Businesses are using this technology to improve their strategies and to find predictive information to gain business advantage, which is called business intelligence [15]. Data mining and business intelligence work together to support decision-making processes where businesses identify opportunities and risks by processing and analyzing data [16]. Data mining is used in a wide range from planetary geology to marketing to health services [17].

Real estate is one of the different areas that data mining is used for decision support for investment, risk analysis, and pricing decisions. Fortunately, there are lots of statistical data in the industry, such as the total dimension of investment, floor space started and finished in every year, space of house pre-selling by region, the average house price in the different region and so on [13]. One other must-have trait of the decision support in real estate is to focus on strategic decisions rather than operational one. More specifically, they should contribute to reducing the risk faced by managers when they need to make decisions regarding future options [12]. It is also important to minimize the risk of potential losses due to wrong decisions in real estate which can be prevented by decision support system since the property managers face everyday critical risk management decisions [12].

Besides Automated Valuation Model (AVM) that determines the price of a real estate by comparing the values of similar properties by using regression model has been used much in real estate industry as an example of data analysis [18]. Big real estate agencies such as Realtor, Zillow, and Trulia have used AVM for 10 years. Moreover, they provide information about the neighbourhood trends to estimate mortgage payment, cost of ownership, history of the property [19].

The idea of applying data mining into real estate industry is applaudable. It encourages interdisciplinary work but leads to face many problems when it comes to application. One of the problems is there are many different variables that affect the real estate market such as individual income and population. Therefore, it is hard to estimate a value for a house in a different area. Another one is that the data in the real estate industry is abundant and getting bigger. One has to deal with huge sets of data which is important to deduce right inferences. Lastly, the prediction error that happens in every estimation. The data mining methods try to minimize the loss reasoned by prediction error. [13] Therefore, data mining techniques can handle these problems not completely but partially.

The data mining process in real estate is as follows according to a research:
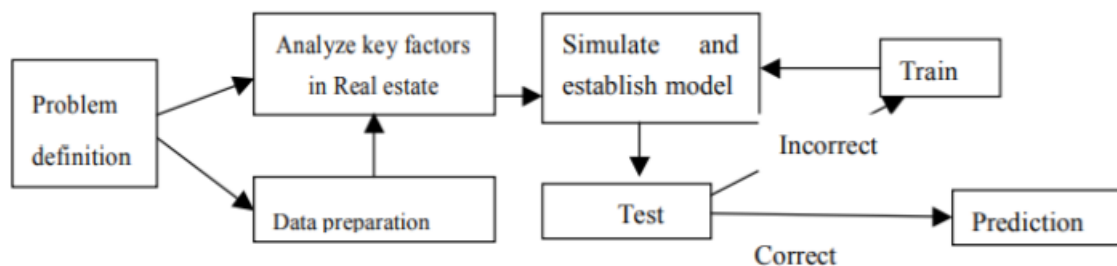

Figure 1: The application flow of data mining technology in the real estate industry [13]

After defining the problem, the data that needs to be mined is determined which leads to the analyze key factors in Real Estate with the problem. After analyzing key factors, a model is simulated and established. After the testing of the model, if it's incorrect, the simulation and establishment of the model are done again after more detailed research. However, if the testing result is correct, the prediction is made to the property.

7. Conclusion

As a conclusion, the development of the technology provides the ease in reaching/using the huge amount of data by mobile applications. The companies integrate new techniques that data science brings. As this article mostly deals with, having mobile apps can help real estate consultants while they are on the field or while they are searching for a lot/property by data mining techniques. Also, they deal with lots of paperwork. If it can be done via mobile phones, the time spent on road/workload is lightened for them. Besides, the gamification techniques improve their productivity, strengthens communication processes and therefore increase their motivation. In this article, we see that gamification and data science are mainly used as solutions for employees in many sectors, but since these applications are not enough for the real estate sector, we will make an application that supports motivation and decision-making processes in their daily live.

References

[1] S. Skripak, Fundamentals of Business. Blacksburg, VA: Virginia Tech University Libraries, 2016.

[2] Richard M. Ryan and Edward L. Deci, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemporary Educational Psychology,* vol. 25, no.1, pp. 54-65, 2000.

[3] K. Burton, "A Study of Motivation: How to Get Your Employees Moving," SPEA Honors Thesis Spring 2012.

[4] N. Obiekwe, "Employee Motivation and Performance. Centria University of Applied Sciences," 2016.

[5] M. Tröndle, "Gamification - Does it lead to higher motivation?*",* 2016.

[6] A. L. Negruşa, V. Toader, A. Sofică, M. F. Tutunea and R. V. Rus, "Exploring Gamification Techniques and Applications for Sustainable Tourism," *Sustainability,* vol. 2015, no.7, pp. 11160-11189, 2015.

[7] M. Froling and Jonas Nabseth, "An approach on designing gamification for a mobile application," 2017.

[8] D. M. R. Islam and T. Mazumder, "Mobile Application and Its Global Impact," *International Journal of Engineering and Technology,* vol. 10, no. 06, pp. 72-78, 2010.

[9] M. A. Tornetta and P. Meeting, "REAL ESTATE SEARCH AND LOCATION". Patent 5,032,989, 1991.

[10] E. Hromada, "Real estate valuation using data mining software," Procedia Engineering, vol. 164, pp. 284-291,2016.

[11] F. Provost and T. Fawcett, "Data Science and Its Relationship to Big Data and Data-Driven Decision Making," Big Data, vol. 1, 2013.

[12] R. Valverde, "A Risk Management Decision Support System for the Real Estate Industry," International Journal of Information and Communication Technology Research, vol. 1.

[13] X. G. LI and Q. M. LI, "THE APPLICATION OF DATA MINING TECHNOLOGY IN REAL," 2006.

[14] "Data Never Sleeps 6 | Domo", *Domo.com*, 2018. [Online]. Available: https://www.domo.com/learn/data-never-sleeps-6. [Accessed: 21- Oct- 2018].

[15] R. Hema. and N. Malik, "Data mining and business intelligence," In Proceedings of the 4th National Conference. 2010

[16] Abdussalm P. K, "Data Mining for Business Intelligence," *International Journal of Engineering and Management Research* (IJEMR), pp. 121-127, 2017.

[17] Fayyad, U., Piatetsky-Shapiro, G., and Smyth, P, "From data mining to knowledge discovery in databases," *AI magazine*.

[18] "Automated Valuation Model - AVM", *Investopedia*, 2018. [Online]. Available: https://www.investopedia.com/terms/a/automated-valuation-model.asp. [Accessed: 21- Oct- 2018].

[19] "Big Data Applications in Real Estate Analysis", *codeburst*, 2018. [Online]. Available: https://codeburst.io/big-data-applications-in-real-estate-analysis-502accc54dc8. [Accessed: 21- Oct- 2018].