Investment evaluation of brownfield redevelopment

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Abstract

This article discusses investment appraisal of brownfields. Due to the complex nature of investments on this level it is necessary to carefully examine all parameters and factors influencing the decision. First the strategic needs of the investors have to be clear. Then the basic information like for example cost of capital, estimated duration of the project, taxation implications have to be taken into consideration. With enough information the combination of investment appraisal methods can be used. These methods work with discounted cash flow, net present value, rate of return and other financial indicators. This article discusses the basic methods and also the specifics related to the use of these methods for appraising brownfields.

Keywords
investment appraisal, real estate, brownfield, indicator, NPV, cash flow

Introduction and research objectives

This paper contains information about commonly used investment appraisal methods and their use for investment evaluation in brownfield redevelopment. The author of this paper is developing a new method for investment evaluation based on the use of sophisticated algorithms based on fuzzy logic. The objective of real estate investment process is to find and choose the optimal investment alternative considering all relevant factors and variables. But in some cases decision based on known variables may be skewed and not optimal. Some important details may be unknown and they might have significant influence on the final decision. In order to make the optimal investment decision it is useful to make several different types of investment evaluations and then compare the results.

Unlike the commonly used methods which use several different financial indicators the new research allows better work with the input variables - for example the variables of investment alternatives can be thoroughly analyzed and compared and after a special algorithm is used the individual investment alternatives can be grouped into clusters of similar properties which have similar traits. It then opens new possibilities to compare these clusters of investment alternatives with the commonly used financial indicators discussed in this paper. This new methods of investment evaluation gives investors from small to medium sized enterprises new information and it makes it easier for them to select the optimal investment alternative.
Discussion

Brownfields are abandoned or underused industrial and commercial facilities available for re-use. Expansion or redevelopment of such a facility may be complicated by real or perceived environmental contamination. This research is partially focused on brownfields and on ecological aspects related to brownfields. It is very important to reuse existing real estates. Due to the changing market environment in Czech Republic in the past two decades there are many capacities that are not used. It is possible to purchase these real estates. However there are specific factors to consider like for example contamination of soil or investments that have to be made to meet the recent more strict legislation related to ecology. Soil and groundwater under the brownfield may be contaminated by pollution or hazardous waste. Brownfields exist mostly in industrial sections of cities or are close to abandoned factories or other polluting operations. In most cases it takes several years to repair the damages done to the environment. Typical contaminants that can be found in most brownfields can be hydrocarbons, pesticides, asbestos, solvents or other chemicals. The contamination may cause health risks and special measures have to be taken in order to reduce or eliminate this contamination. To remove the contaminants can be very costly and therefore the related costs have to be calculated into the future costs should the investors decide to purchase polluted brownfield. Governments and states try to promote the redevelopment of brownfields but for investors it is more difficult to invest into the redevelopment of brownfields because there are more factors to consider and the investment may become more expensive or more risky if they choose to buy brownfield instead of building brand new plant on previously unused land. Following discussion focuses on the specifics of commonly used methods for financial appraisal.

Investment evaluation is a very important phase during the decision making process about about long-term investments. The buyer has to make sure to choose the right investment opportunity. There are many different investment opportunities and it is very complex to evaluate the firms long-term strategic goals and decide which investment opportunity is right fro the company. First step to make is to collect the basic information - in this step the decision makers have to make sure that all relevant and important information is available for the evaluation. Identifying the key needs of the business enterprise is also critical. Due to the irreversibility of large investments there is no space for incorrect assumptions and conclusions rooting in missing or incorrect information collected about the investment opportunity. Before the investment is made the buyer has to create a very comprehensive business plan. Company has to have clear strategic goals and has to know what are the primary and secondary objectives. Also the decision makers have to predict the possible scenarios about what could happen on the market and what could negatively influence the investment not only at the present time but also in the future. Evaluation of the investment opportunity itself has several phases. First it is necessary to clearly define and list goals of the investment. Managers have to be sure that they need new capacities and investment is not avoidable by any other means. Large and long-term investments are always risky and in a sense can endanger the operation of a business enterprise as it becomes more vulnerable. Estimating the payback period for the investment is vital - large investment costs a lot of resources and often company has to concentrate resources and funding it would use elsewhere to make the investment. It has to be clear when the investment project will be profitable - how long will it take before the investment covers its costs and starts to generate profit for the investors. Comparing the investment opportunity with alternative investment opportunities on the market is also a very important step - all other alternative investment opportunities have to be carefully examined and compared before the final decision is made.
After the set of all possible investment alternatives is reduced the decision makers have to create a reasonable financial plan to ensure that enough funding is available and related costs will not endanger the operation of whole business enterprise. After the financial plan has been made it has to be reviewed by independent professional advisers. Evaluating the investment opportunity risks is also a very important phase of the decision making process. Long-term investments are risky especially for small to medium sized enterprises - which usually have significantly less resources than large companies. Large corporation can easily allocate enough resources to make even large investment projects reality without the need to borrow additional resources from banks and other institutions. Calculating the risk and potential loses of the investment project is vital. Any promising investment project can lead to heavy loses if something unexpected happens. Of course the investors have to calculate their plans so that they have reserves to cover the impact of unexpected negative events which influence their investment. It is also required to get enough information and to settle all the regulatory requirements - these requirements may include environmental, technical, zoning, legislative, technological and other requirements.

Investors also have to determine the financial and technological reserves that can be used for the investment project. Large companies have more available resources and can more easily obtain new resources from banks. The smaller company the fewer available resources it usually has and it is also more complicated to borrow money for investment projects. Banks are closely examining the business plan to see what risks can endanger the investor and can cause him not to be able to repay his debt. During last two decades the banks became more careful when lending financial resources to small to medium sized enterprises as large percent of their business plans failed and the companies were not able to repay their debts. It is also necessary to calculate the potential loses for the worst case scenario. It is easy to plan for the best case scenario but such plans are also dangerous - it is also necessary to make a plan for worst case scenario and investors can expect that with high probability the investment will be in the bounds defined by the best and worst case scenario. Legal aspects of the investment project have to be confirmed with independent professional advisers. After all these steps it is required to secure the investment by assets and then to insure the assets so unexpected development cannot negatively impact the investment project.

Investments are usually appraised with the help of financial indicators. From the point of view of the financial indicators it is necessary to realize several different things. Time value of certain investment is very important. It is known that the time value of the same amount of money today is worth more than the time value of the same amount of money received in the future. Investors can take into consideration the growth of prices on the real estate market. Especially in the Czech Republic investors can purchase real estates for prices that are much lower than they would pay in for example in Germany or United Kingdom. But there are also differences in purchasing power of customers, costs of services and average incomes of employees. Next important thing to consider is the measure of true profitability - to measure the true profitability of the investment project the investors have to calculate all cash flows occurring over the entire life of the project and so the true worth of the investment project can be determined. It is also important to calculate the costs, profits and value of the investment from the point of view of the shareholders.
First non-discounted cash flow method is payback period. Payback period is frequently used because of its simplicity. It is calculated by dividing initial investment by annual cash inflows. Accounting rate of return is another method and it is calculated as dividing the average income by average investment. Investment should be accepted when the accounting rate of return is higher than the minimum rate established by the investors. Return on investment (ROI) is the performance measure used to measure the efficiency of investment project. It can be also used to compare different investment alternatives. The calculation of ROI requires to divide the difference between gains from the investment and cost of investment by cost of investment. The result of this calculation is a percentage or ratio. Internal rate of return (IRR) is a popular method because it calculates the profitability as a percentage and offers a great possibility for comparison with the opportunity cost of capital. IRR has several advantages for example it recognizes differences in the time value of financial resources. Another advantage is that it takes all cash flows during the entire lifetime of the investment project into consideration. From the point of view of the shareholder value - whenever the IRR is higher than the opportunity cost of the capital the shareholders wealth will increase. Profitability index (PI) is calculated by dividing present value of cash inflows by the initial cash outflow. If the PI is greater than one the investment project should be accepted.

Net present value (NPV) is a frequently used economic method of evaluating investment proposals. It is discounted cash flow method that recognizes the time value of money. It postulates that the cash flows that appear during different phases of the lifetime of the project differ in real value and can be compared only when the equivalent of the present value is determined. The NPV calculation has several steps:

1. Cash flows of the investment project should be forecast realistically.
2. Discount rate has to be calculated to discount the forecast future cash flows, the discount rate reflects the opportunity costs of capital and the expected rate of return should the capital be invested in some other way - it is also necessary to calculate the expected risks related with the alternative investments.
3. Present value of cash flows should be calculated using the opportunity cost of capital as the discount rate.
4. Net present value (NPV) should be calculated by subtracting present value of cash outflows from present value of cash inflows. The investment project should be accepted if the NPV is positive.

Positive net present value contributes to the wealth of the shareholders. Positive NPV tells investors that the project cash inflows are higher than they would be if the capital would be invested into other alternative investment. The main idea is to carefully compare the investment alternatives and to calculate the real value of the future cash slows as it differs from the cash flows at present time. The investment project should be accepted when the NPV is positive, it may be considered as positive when the NPV is close to zero and the investment possibility should be rejected when the NPV is negative. NPV can be used to select between several different investment projects that are mutually exclusive. The investment project with the highest NPV should be chosen by the investors. It is also possible to directly grade the investment alternatives by their calculated NPV. The net present value method is in concordance with the objective of shareholder value maximization. Therefore the NPV is a very useful tool for shareholders to examine and evaluate the investment decisions made by the company. But the NPV indicator has also several problems and disadvantages.
One significant problem is the cash flow estimation - NPV calculation requires estimated future cash flows but it is difficult to make good estimates of the future cash flows. It is also difficult to precisely measure the discount rate - the discount rate can be also only estimated. Caution needs to be applied if the NPV method is used to evaluate several investment alternatives with different parameters for example if the lifetime of one project is several times longer than those of the other investment projects - NPV can lead to results and recommendations that can hide the differences between the investment alternatives. NPV also depends on the discount rates - should the discount rates be calculated based on different assumptions it influences the results of NPV.

Conclusions

In this research the comparison of different investment alternatives is very important in order to determine which investment alternative should be chosen by the investors. The author of this research researches new way of investment appraisal based on the use of fuzzy logic. In this research each of the investment alternatives will be described by a set of about twenty parameters which are then processed by several different methods based on fuzzy logic. For the investors it is very useful to compare the commonly used financial indicators with the results of the newly designed investment appraisal methods based on fuzzy logic. In ideal case both methods should produce same results - select optimal investment alternative. But the newly developed method which is a result of this research provides overview of all different variables and allows investors to weigh the parameters differently. Also clustering the investment alternatives into groups allows to find common traits between different investments. Investors from small to medium sized enterprises can evaluate their investment alternatives not only with the help of commonly used financial indicators which omit many different aspects of the investment but they can compare the results they get from commonly used methods with the results produced by the new method based on fuzzy logic which utilizes sophisticated clustering algorithms and statistical methods of evaluation of individual groups of parameters. With the new research the decision makers get new tools which allow them to make new conclusions from the existing data.

References

Books

Journals