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# Financial Stability Management of an Industrial Enterprise Based on the Formation of Signal Indicators

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**Abstract.** The article contains the author's methodological toolkit for managing the financial stability of an industrial enterprise, as well as the results of its use. To manage the financial stability of an industrial enterprise, it is proposed to form signal indicators that allow evaluating the work of circulating capital management. For this, it is proposed to make evaluation according to the following groups of signal indicators: indicators characterizing the level of receivables; indicators characterizing the level of external obligations of the enterprise. The result of the author's algorithm use is the determination of the integral indicator of financial stability, the value of which includes three components: structure indicators, dynamics indicators and indicators of the intensity of the obligations use. The specific weight of each group was determined by expert judgment and is associated with the recommended values of signal indicators. The results of the calculations show that the use of signal indicators in the management of the financial stability of an industrial enterprise makes it possible to timely identify and eliminate problems in the regulation of circulating capital and to increase the financial potential.

## 1. Introduction

In the context of fierce competition, enterprises are particularly challenged to ensure the continuity and sustainability of their operations. In connection with this, the topical direction of management improving in the current economic reality is the increasing of the companies' financial stability. An integral part of the activity of any enterprise that can have a tremendous impact on the financial stability of the company and its key economic indicators are the business accounting, i.e., the commercial part of the receivables and the external obligations of the enterprise. In order to effectively manage them, creating reserves and increasing the financial potential of the enterprise, it is necessary to build a competent financial policy of the business accounting, allowing managers and business owners to quickly respond to market challenges and to create a sustainable competitive advantage by effectively mobilizing all their resources, as well as increasing the pace growth and development.

The aim of the study is to form the signal indicators for evaluating the external obligations and receivables for managing the financial stability of an enterprise.

The financial stability of an enterprise or the degree of its independence from borrowed funds is one of the key effective performance indicators. It can have a tremendous impact on the relationship with contractors and the company's competitiveness in the market. In recent years, due to the digitalization of the economy and political instability, the problem of ensuring the operation continuity of the enterprises both in Russia and in the world market as a whole has been especially acute. In connection with this, the financial stability is the basis for the organization's market stability and maintaining the



level of its competitiveness. This indicator is aggregative and systematizes information on the state of the company's financial resources, which preserves the possibility of financial maneuver and ensures the continuity of the current activities.

It is important to understand that the financial capabilities of any enterprise are almost always limited, therefore the main function of ensuring financial stability is to use the available resources in the most efficient way within these constraints.

It should be noted that there is a large number of works about analysis of the financial position of the company in modern conditions. Among them, the following works should be noted [4, 20, 21, 32].

A universal principle of information and financial correspondence of methods and tools is distinguished between management information and the chosen vector of the financial strategy of the company's development. Based on the information collected, the risk maps of the enterprise are built, which allows eliminating the imbalances in the development of the enterprise, to ensure its financial stability [10, 31, 32].

Currently, enterprises have to withstand fierce competition in raising capital to finance their business. At the same time, there is a close relationship between the stable financial position of the company and its innovative activities [2]. The following works are devoted to the methodological foundations of the study of assessing the effectiveness of managing organizations [1, 5, 6, 7, 8, 11, 14, 24, 25].

The combination of finance and information technology has become relevant in the past few years. Trends in the impact of digitalization on financial management are discussed in the following papers [1, 9, 12, 23, 33]. Works on the use of the theory of fuzzy sets for building business models based on financial indicators are becoming relevant today [19, 21, 33]. In this case, the system of indicators is based on certain aspects of the industrial enterprise activity, which reduces the efficiency of management decisions. To improve management efficiency and reduce the risks in [22], it is proposed to introduce a linguistic variable to assess financial stability and divide the set of its values into blocks of terms.

In modern conditions, it becomes necessary to determine the main ways to mobilize the hidden reserves of the enterprises and to ensure an increase in the cost of the validity of decisions made by the local management [26, 30]. The efficiency of the enterprise, according to Rybyantseva, M.S., Ivanova, E.A., Demin, S.S., Dzhamay, E.V., Bakharev, V.V., depends on the state of finances, which requires consideration of the main methods of achieving financial stability.

The study of the financial stability of organizations and its key components has been given close attention in the works of such scientists as Bakanov M.I., Kovalev V.V., Krylov S.I., Savitskaya G.V., Sokolov Ya. V., Sheremet A.D

Each of the approaches has its own advantages and disadvantages, which indicates the need to improve such methods while consolidating changes in the digitalization environment.

The literature search allowed us to summarize the current experience and the specific nature of financial analysis in the context of digitization and revealed a lack of research in the field of predicting financial stability indicators. All of the above proves the relevance of the research topic, the general task of which is to identify the features of the "financial stability" category for the formation of the effective enterprise management based on the signal indicators.

## 2. Research methods

Despite the fact that the group of indicators forming the concept of "financial stability" is primarily intra-organizational, that is, it reflects the state of affairs within a particular organization, it develops under the influence of not only internal, but also external factors. Internal factors include the following: composition, structure and production technology; the amount of fixed costs; the structure of the company's assets (the proportion of non-current assets in all assets); financial policy of the enterprise; organizational structure of the enterprise.

External factors include: the state of the industry; the state of the national economy; financial and tax policy of the state; the political situation in the country and in the world; laws, by-laws and other

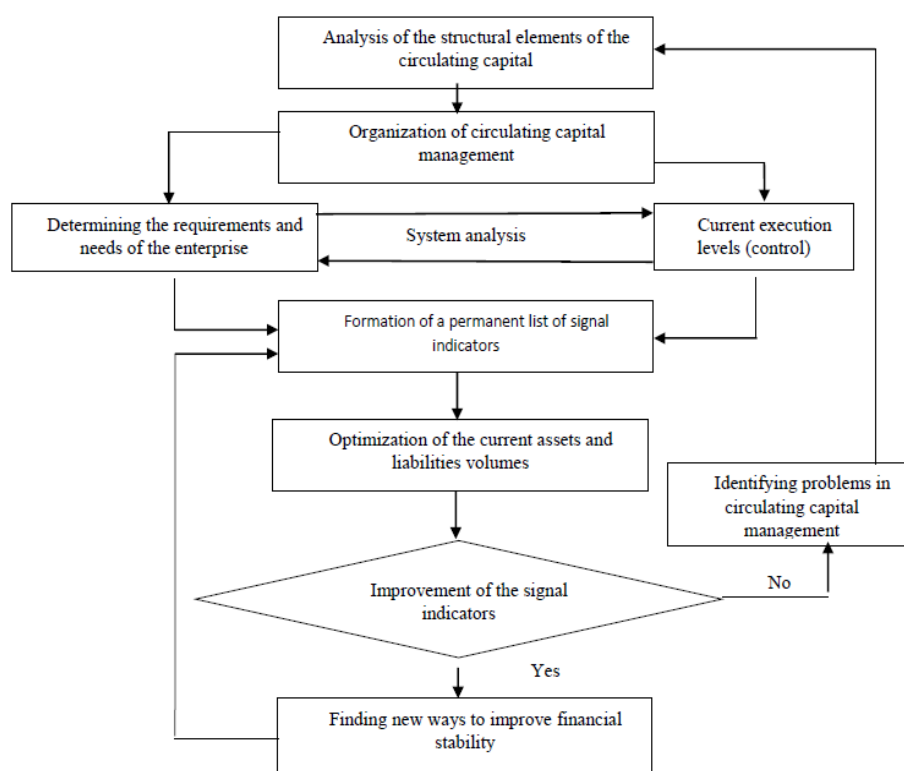
regulatory legal acts that impose additional restrictions on the activities of enterprises.

Thus, it is important to understand that the financial capabilities of any enterprise are almost always limited; therefore the main function of ensuring financial stability is to use the available resources in the most efficient way within these limitations.

There are many interpretations of the concept of "financial sustainability". Analyzing the approaches to the essence of this economic category, one can see that the scientists have different ideas of the economic essence of the concept. Some of them unambiguously determine financial stability by the ratio of the volume of own and borrowed sources of funds [16, 27, 29]. However, another group of researchers insists that the characterization of financial stability will not be complete if it is based only on the analysis of liabilities, that is, sources of funding, and therefore should also include an analysis of the directions of capital investment [3, 28, 13]. This is due to the fact that the growth rate of circulating assets should exceed the growth rate of non-circulating assets, which indicates the release of funds in the most mobile forms and their involvement in the main activity [17, 18].

Based on the above, the following algorithm for generating signal indicators for managing the financial stability of an industrial enterprise is proposed.

Fig. 1 shows that in order for an enterprise to achieve the desired indicators of the financial stability, it is necessary to choose a circulating capital management policy based on the requirements and needs of an industrial enterprise in it, as well as the management structure. In its policy the company seeks to improve the financial stability. For this it is proposed to consider the following signal indicators: indicators characterizing the level of receivables; indicators characterizing the level of the external obligations of the enterprise. Next, we will consider each group of indicators.



**Figure 1.** Algorithm for the formation of the signal indicators for managing the financial stability of an industrial enterprise.

The analysis of debtors includes the study of the proceeds volume that this contractor brings, the amount of its debt with the expected amount of repayment and the forecasted value of losses from violating the established maturities of debt, with subsequent grouping of contractors by attractiveness rating. As a working analysis tool, it is proposed to use the ABC analysis of the contractors (groups of contractors) of the enterprise (see Table 1). Then, for each group of contractors, determine the terms of the credit policy.

This method will allow you to establish the individual characteristics of working with certain contractors (groups of contractors), for example, the payment schedule or the status of receivables, as well as to assess the possible risks of working with each group of contractors. The identified risks can be taken into account in the organization's pricing policy for each segment [15].

**Table 1.** Commercial debtors analysis.

| Contractor<br>(group of contractors) | Revenue (volume of sales) |                             |    |                       | Debt                        |                   | Re-pay-ment<br>fore-cast,<br>thou-sand<br>rubles | Loss<br>fore-cast,<br>thou-sand<br>rubles |
|--------------------------------------|---------------------------|-----------------------------|----|-----------------------|-----------------------------|-------------------|--------------------------------------------------|-------------------------------------------|
|                                      | In abso-lute<br>terms     | % of the<br>total<br>volume | of | In abso-lute<br>terms | % of the<br>total<br>volume | of the<br>vol-ume |                                                  |                                           |
| Group A                              |                           |                             |    |                       |                             |                   |                                                  |                                           |
| Group B                              |                           |                             |    |                       |                             |                   |                                                  |                                           |
| Group C                              |                           |                             |    |                       |                             |                   |                                                  |                                           |
| TOTAL                                |                           |                             |    |                       |                             |                   |                                                  |                                           |

Further, the signal indicators for assessing the effectiveness of the receivables control system are formed. The signal indicators in the analysis of the state of receivables are understood as key characteristics, a change in the values of which indicates an improvement or deterioration in the state of this debt, and also indicates those centers of responsibility to which special attention should be paid by managers or other stakeholders: groups of contractors, organizations divisions and other objects. Table 2 shows the signal indicators for assessing the effectiveness of the control system for changes in receivables. They include three groups of indicators: intensity indicators, dynamics indicators and structure indicators.

**Table 2.** The signal indicators for assessing the effectiveness of the control system for changes in receivables.

| Index                                                     | Formula                                                                             | Role in the management system                                                                                                                                                                                                        |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intensity indicators                                      |                                                                                     |                                                                                                                                                                                                                                      |
| Accounts receivable turnover (in times)                   | The ratio of revenue and average value of receivables for the period                | It characterizes the number of turnovers made by the receivable for the period. The more intensively accounts receivable are used, the higher the value of this indicator, the higher the efficiency of the company's credit policy. |
| Average duration of one turnover of receivables (in days) | The ratio of the average value of accounts receivable in the studied period to rev- | It characterizes the average residence time of receivables in the turnover cycle                                                                                                                                                     |

|                                         |                                                                                              |                                                                                                                               |
|-----------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|                                         | revenue for the period                                                                       |                                                                                                                               |
| Dynamics indicators                     |                                                                                              |                                                                                                                               |
| Collection rate                         | The ratio of paid (extinguished) receivables in the current period to revenue for the period | It characterizes the share of payment for repayment of receivables in the total volume of products sold in the current period |
| Accounts receivable growth rate         | The ratio of accounts receivable of the reporting period to the value of the previous period | It allows you to analyze the volume of the indicator in dynamics to the previous period                                       |
| Structure indicators                    |                                                                                              |                                                                                                                               |
| Accounts receivable concentration ratio | The ratio of receivables in the period under study to the balance sheet currency             | It shows the level of debt burden before the enterprise                                                                       |
| Accounts receivable ratio               | The ratio of receivables in the period under study to the value of current assets            | It characterizes the degree of the company's dependence on its debtors                                                        |

The signal indicators for assessing the effectiveness of the control system for changes in receivables are analyzed in dynamics, in comparison with the plan, with the data of similar enterprises, as well as with the recommended industry values, where the determination of such is possible.

The second group of the signal indicators includes the indicators that characterize the level of external obligations of an enterprise. Calculation of these indicators and their role in the management system of an industrial enterprise is presented in table 3. They include three groups of indicators: intensity indicators, dynamics indicators and structure indicators.

**Table 3.** Signal indicators in the control system of the external obligations of an enterprise.

| Index                                                         | Formula                                                                                 | Role in the management system                                                                                                                                               |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intensity indicators                                          |                                                                                         |                                                                                                                                                                             |
| Accounts payable turnover (in times)                          | The ratio of the cost of sales and the average value of accounts payable for the period | It characterizes the number of turnovers made by accounts payable for the period. The more intensively accounts payable are repaid, the higher the value of this indicator. |
| Average duration of one turnover of accounts payable, in days | The ratio of the average value of accounts payable for the period and the cost of sales | It reflects the rate at which a company repays its debts to creditors                                                                                                       |
| Dynamics indicators                                           |                                                                                         |                                                                                                                                                                             |
| Self-financing ratio                                          | The ratio of the value of equity capital to the value of borrowed                       | It characterizes the quality of sources of formation of the property of an enterprise                                                                                       |

|                              |                                                                                                      |                                                                                            |
|------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Accounts payable growth rate | capital<br>The ratio of accounts payable of the reporting period to the value of the previous period | It allows analyzing the volume of the indicator in dynamics to the previous or base period |
| Structure indicators         |                                                                                                      |                                                                                            |
| Debt concentration ratio     | The ratio of borrowed capital for the period and the total balance sheet                             | It shows the level of the company's debt burden                                            |
| Financial independence ratio | The ratio of equity for the period and the total balance sheet                                       | It characterizes the degree of independence of the company from creditors                  |

On the basis of two groups of the signal indicators, an integral indicator of the level of financial stability of an enterprise is calculated. For this, the following sequence of steps is proposed.

The level of financial stability of an enterprise is determined by means of an expert assessment for each of the three categories of indicators (intensity, dynamics, structure) for both groups: indicators characterizing the level of receivables; indicators characterizing the level of external obligations of the enterprise. All indicators are considered to be approximately equivalent to assess the level of financial stability of an industrial enterprise.

The calculation of the integral indicator is carried out as the total value of the points of the signal indicators for each direction, the importance of each of them is determined by expert means (Table 4).

**Table 4.** Repair service state indexes.

| Index                   | Importance group                                         |
|-------------------------|----------------------------------------------------------|
| 1. Intensity indicators | $I_{integr}^{int} = \sum_{i=1}^4 I_i^{int} \cdot d_{ig}$ |
| 2. Dynamics indicators  | $I_{integr}^{din} = \sum_{i=1}^4 I_i^{din} \cdot d_{ig}$ |
| 3. Structure indicators | $I_{integr}^{str} = \sum_{i=1}^4 I_i^{str} \cdot d_{ig}$ |

Dig is the group of the importance of the indicators affects the value of the significance of the indicator in the integral assessment: group 1 has significance - 0.5, group 2 has significance - 0.3, group 3 has significance - 0.2. This ratio was determined on the basis of expert assessments provided by the heads of the industrial enterprises.

The positive dynamics of the integral indicator of the financial stability level indicates the effective management of the circulating capital of an industrial enterprise.

### 3. Results and discussion

The proposed algorithm was introduced into the work of Uralteploenergomontazh LLC. The analyzed enterprise is part of the metallurgical industry and operates on the territory of the Sverdlovsk region. The analysis of consumers of LLC UTEM is presented in Table 5.

**Table 5.** Consumer market segments for LLC "UTEM".

| Segment characteristics                                       | Segment 1                                                                   | Segment 2                                   | Segment 3                              | Segment 4                              |
|---------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------|----------------------------------------|----------------------------------------|
| Segment size                                                  | Very big                                                                    | Big                                         | Medium                                 | Small                                  |
| Segment growth rate                                           | Moderate                                                                    | High                                        | Low                                    | Insufficient data                      |
| Segment yield                                                 | More than 50% of the company's revenue                                      | About 20-30% of the company's revenue       | Less than 10% of the company's revenue | Less than 10% of the company's revenue |
| The intensity of competition in the struggle for this segment | High; intensive growth of low-value offers on the market                    | High, moderate                              | Low                                    | Insufficient data to detect            |
| Sales and service costs                                       | The highest among all segments; proportionally to revenue from this segment | Proportionally to revenue from this segment | Low                                    | Low                                    |

Consider the results of the implementation of the proposed algorithm in the operation of the enterprise. First, let's analyze the structure of the accounts receivable of "UTEM" LLC (Table 6).

**Table 6.** Structure of the accounts receivable of "UTEM" LLC.

|                          | 2018            |                 | 2019            |                 | Changes per year |                |                           |
|--------------------------|-----------------|-----------------|-----------------|-----------------|------------------|----------------|---------------------------|
|                          | Thousand rubles | Spec. weight, % | Thousand rubles | Spec. weight, % | Thousand rubles  | Growth rate, % | Share in the structure, % |
| Debt on economic content |                 |                 |                 |                 |                  |                |                           |
| Buyers                   | 596             | 94,3            | 781             | 94,0            | 185              | 31,0           | -0,2                      |
| Advances issued          | 34              | 5,4             | 25              | 3,0             | -9               | -29,4          | -2,5                      |
| Other commercial debtors | 2               | 0,3             | 25              | 3,0             | -23              | 1150           | 2,7                       |
| TOTAL:                   | 632             | 100             | 831             | 100             | 199              | 31,3           | -                         |

Based on Table 6, it is impossible to give a positive or negative assessment of the increase in the accounts receivable by 31%, since it can be caused both by an increase in revenue (that is, the number of orders and/or their volume), which deserves a positive assessment, and by non-compliance with the payment discipline of customers, which indicates a decrease in the effectiveness of the financial policy carried out in relation to this object of management and, as a result, deserves a negative assessment.

For further conclusions, let us analyze the signal indicators that characterize the level of receivables in three categories: intensity, dynamics and structure (Table 7).

**Table 7.** Calculation of signal indicators characterizing the level of accounts receivable of LLC "UTEM".

| Index                                                     | 2018 | 2019 |
|-----------------------------------------------------------|------|------|
| Intensity indicators                                      |      |      |
| Accounts receivable turnover (in times)                   | 26,7 | 18,2 |
| Average duration of one turnover of receivables (in days) | 13,5 | 19,8 |
| Dynamics indicators                                       |      |      |
| Collection rate                                           | 5,99 | 6,14 |
| Accounts receivable growth rate                           | 1,26 | 1,31 |
| Structure indicators                                      |      |      |
| Accounts receivable concentration ratio                   | 0,62 | 0,87 |
| Accounts receivable ratio                                 | 0,76 | 0,92 |

Based on Table 7, it can be concluded that the control system implemented in relation to receivables cannot be considered effective, since in 2019 there is a decrease in the intensity of use of receivables, an increase in the volume of payment for shipped goods and services on a deferred payment basis (trade credit), and there is also the attraction of additional assets in the turnover of receivables, which can be assessed negatively. Next, we will analyze the signal indicators in the control system of the external obligations of the enterprise (Table 8).

**Table 8.** Calculation of the signal indicators in the control system of the external obligations of LLC "UTEM".

| Index                                                         | 2018 | 2019 |
|---------------------------------------------------------------|------|------|
| Intensity indicators                                          |      |      |
| Accounts payable turnover (in times)                          | 0,66 | 0,4  |
| Average duration of one turnover of accounts payable, in days | 23,5 | 14,6 |
| Dynamics indicators                                           |      |      |
| Self-financing ratio                                          | 1,9  | 2,6  |
| Accounts payable growth rate                                  | 84,3 | 75,4 |
| Structure indicators                                          |      |      |
| Debt concentration ratio                                      | 2,45 | 0,28 |
| Financial independence ratio                                  | 0,66 | 0,72 |

Indicators in the system of management of external obligations of LLC "UTEM" characterize the management of the company's circulating capital from the positive side.

The subsequent calculation of the integral indicator of the financial stability level of the enterprise on the basis of the author's methodology, confirmed the positive dynamics of the financial stability of the enterprise in question both at the beginning and at the end of the year, and during the studied period there is an improvement in indicators. This circumstance indicates the advisability of using the author's algorithm for generating the signal indicators for managing the financial stability of an industrial enterprise.

#### 4. Conclusion

The main goal of the study is to establish such a circulating capital management system so that it is as effective as possible in terms of the company's financial stability. Without diminishing the importance of the study of other financial indicators, the task of the study is to consider the viability of the compa-

ny in terms of external threats.

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