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EUROPEAN JUSTICE RULES THAT SPANISH TAX REGULATION VIA "FORM 720" VIOLATES THE EUROPEAN FREE MOVEMENT OF CAPITAL

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Abstract. *This study analyses the Judgement of the Court of Justice of the European Union (CJEU) of 27 January 2022, case C-788/19, resolving the appeal presented by the European Commission against the Kingdom of Spain which considers that the regulations governing the obligation of residents in Spain to declare assets and rights located abroad via "Form 720", and the general rules on penalties for non-compliance with that obligation, represent a restriction of the free movement of capital, and consequently violate European law. The European Court upholds the appeal and annuls the contested rulings. Based on this judgement, the study also analyses its effects on Spanish national law and on the taxpayers affected.*

Keywords: *tax regulation, declaration, assets, abroad, "Form 720", European law, CJEU.*

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Introduction

Spanish Law 7/2012, of 29 October, amending the regulations on taxes and budgets, and adapting financial regulations for intensified activities to prevent and combat fraud, amended the 18th Additional Provision (AP) of Spanish General Tax Law 58/2003 of 17 December (GTL), introducing the obligation for Spanish residents to provide information on their assets of any kind located abroad. It also decreed that there would be no limitation period for actions not known to the Spanish tax authority, which it became aware of later, and approved a regime of penalties for those failing to comply with this obligation. For formal compliance with the obligation to provide information, the information return "Form 720" was created for Spanish residents to report their foreign assets and rights.

The European Commission presented an appeal to the Court of Justice of the European Union (CJEU) with the complaint that the Kingdom of Spain was in breach of its obligations pursuant to Articles 21, 45, 49, 56 and 63 of the Treaty on the Functioning of the European Union (TFEU), and to Articles 28, 31, 36 and 40 of the European Economic Area (EEA) Agreement, due to the consequences stipulated in the new national law for failure to comply with the mandatory reporting of foreign assets and rights via "Form 720". According to the Commission, the disputed regulation, without any equivalent applicable to Spanish residents' assets and rights located in Spain, established restrictions on the free movement of capital insofar as its effect would be to disincentivise transferring their assets abroad. Thus, in their opinion, there should not be any difference in the treatment of taxpayers resident in Spain because their assets are located inside or outside Spanish territory.

In the Judgement issued on 27 January 2022, the European court upheld the Commission's allegations and deemed that:

1. Although national legislation may establish a longer limitation period in order to guarantee the effectiveness of fiscal controls and combat tax fraud and evasion arising from concealing foreign assets, the fundamental requirement of legal certainty is opposed to governments making indefinite use of their authority to end an illegal situation, such that the legislation's choice not to have a limitation period goes beyond what is needed for such guarantees.

2. By penalising taxpayers' breaches of their obligations to report their foreign assets and rights more severely than if the assets and rights were in Spain, with a proportional fine of 150% the amount of the tax settlement and the possible addition of flat-rate fines, Spanish legislation disproportionately undermines the free movement of capital for Spanish residents.

Therefore, the CJEU states that the Kingdom of Spain has breached the rulings of the TFEU by denying Spanish taxpayers affected by these regulations, in practice, the option of relying on the general principle of the limitation period, and by applying more severe and disproportionate penalties to a failure to report assets. For these reasons, it considers this to discriminate against Spanish residents with foreign assets, which means a restriction on the free movement of capital within the territory of the European Union (EU).

Based on analysis of this judgement, our study examines:

1. The legality of the obligation to report foreign assets using "Form 720".
2. Changes to the legislation based on the analysed judgement.
3. The validity of actions, settlements and penalties based on assets reported using "Form 720" before this judgement was issued.
4. The options for reimbursement of debts and penalties already paid.

1. The CJEU Judgement to be analysed

On 1 August 2017 the European Commission presented to the CJEU an appeal against the Kingdom of Spain, case C-788/19, deeming it to have failed to fulfil its obligations under Articles 21, 45, 49, 56 and 63 of the TFEU, and Articles 28, 31, 36 and 40 of the EEA Agreement, due to the penalties applied in Spanish law to non-compliance, faulty compliance or late compliance with the obligation to report assets and rights located abroad using "Form 720". Basically, the Commission considers this to violate Spanish residents' right to free movement of capital (https://curia.europa.eu/juris/liste.jsf?language=en&td=ALL&num=C-788/19).

As a result of this disputed national law, Spanish residents who fail to report their assets and rights held abroad using "Form 720", or whose reports are incomplete or submitted late, are liable for regularisation of the tax they owe in amounts corresponding to the value of those assets and rights, even when they were acquired before the limitation period, and for more severe fines from the application of a specific penalty regime.

According to the Judgement of 27 January 2022, the obligation to report assets or rights located abroad using "Form 720", and the penalties incurred by non-compliance, faulty compliance or late compliance with this obligation, which has no equivalent for assets and rights located in Spain, establishes different treatment for Spanish residents depending on the location of their assets. This obligation may deter such residents from investing in other Member States, stop them from doing so, or limit their options for doing so, thus constituting a restriction on the free movement of capital as defined in Article 63.1 of the TFEU and Article 40 of the EEA Agreement.

Also, the CJEU states in this case that the fact that that legislation is aimed at taxpayers who conceal their assets for tax reasons is not such as to call that conclusion into question. The fact that legislation aims to guarantee the effectiveness of fiscal supervision and to prevent tax evasion cannot preclude a finding that there is a restriction on the movement of capital. Those objectives are only among the overriding reasons in the public interest capable of justifying the imposition of such a restriction, but a law which presumes fraudulent behaviour merely because the required circumstances happen to exist, without allowing the taxpayer any option to refute this presumption, goes beyond what is necessary to combat tax fraud and evasion, and comes into conflict with European law.

2. The disputed national law

2.1. The "Form 720" regime

The "Form 720" regime was established by the 18th additional provision of Spanish General Tax Law 58/2003 of 17 December 2003, as amended by Spanish Law 7/2012 of 29 October, amending tax and budget regulations and adapting financial regulations for more intensive actions to prevent and combat fraud.

According to this additional provision, taxable persons are required to provide the tax authorities, under the conditions laid down by regulation, with the following information:

a) Information relating to accounts situated abroad, opened with institutions which carry out banking or credit activities, of which the persons concerned are holders or beneficiaries, or in respect of which they hold, in any form, an authorisation or a right of disposal.

b) Information relating to all securities, assets, stocks or rights representing the share capital, equity or assets of any type of entity, or concerning the transfer of equity to third parties, of which the persons concerned are holders and which are deposited or situated abroad, as well as information relating to the life or invalidity insurance policies of which they are the holders and to life or temporary annuities of which they are beneficiaries following a transfer of cash capital, or even information on movable or immovable property acquired from entities established abroad.

c) Information relating to immovable property and rights in immovable property situated abroad which they own.

Consequently, taxable persons must report all assets and rights which they are required to declare for tax purposes, using a single form. This is understood to mean that individuals liable for the Spanish Personal Income Tax (IRPF); legal entities liable for the Spanish Corporate Tax (IS); permanent establishments in Spain belonging to non-resident persons or entities; and the entities governed by Article 35.4 of the GTL which own or have right of disposal over foreign assets and rights, must all present an information return using "Form 720".

The "Form 720" legal regime has come under a great deal of criticism in legal scholarship. For example, López López (2013) considers that while the goal of requiring reporting of foreign assets and rights is praiseworthy, the provisions regulating this clearly restrict taxpayers' rights and guarantees, in violation of EC law. Falcón Y Tella (2013) also understands that the obligation to report foreign assets and rights is so broad and the penalty regime so severe that it represents a major obstacle and a restriction on the free movement of people and capital, and has a clearly deterrent effect on foreign investments. Sánchez Pedroche (2016) considers that the lack of a limitation period for the IRPF and IS introduced by Law 7/2012 of 29 October 2012 is absolutely retroactive and would go against European law. Zapata García (2018) states that "Form 720" reporting is justified by the Spanish government as a measure established to combat tax fraud, and could be understood as such in general terms, but if one analyses the consequences of a formal error in its presentation, or a late submission, the intention seems closer to a tax grab than combating fraud. Alonso González (2019) also questions the penalty regime of "Form 720", first because of the lack of an explicit mandate in the law, and then because there is no causal relationship between the action (or non-compliance) and the result, a minimum requirement for demanding responsibility. And Fayos Cobos and Tanco (2015) points out that if the information return is presented late, incomplete, or with incorrect data, this represents two breaches of the 18th AP of the GTL and the 1st AP of Law 7/2021, violating the principles of non-concurrence and of proportionality.

2.2. No limitation period

In the scenarios where the "Form 720" regime is applied, the amendments affecting the Spanish Personal Income Tax Law 35/2006, of 28 November 2006 (IRPFL), and Corporate Tax Law 27/2014, of 27 November 2014 (ISL) introduced by Law 7/2012 results in the removal of the limitation period. More specifically, based on that amendment Article 39 of the IRPFL on unjustified capital gains rules that (Fernández Caballero, 2022):

a) "Assets or rights the possession, declaration, or acquisition of which does not correspond to income or capital declared by the taxpayer, and the entry of non-existent debts in a declaration in respect of this tax or wealth tax, or their entry in official books or registers shall be regarded as unjustified capital gains. Unjustified capital gains shall be included in the general taxable amount for the tax period in which they were discovered, unless the taxpayer demonstrates that he or she acquired ownership of the rights or assets in question during a prescribed period.

b) In any event, the possession, declaration or acquisition of assets or rights for which the obligation to provide information referred to in the 18th additional provision of the GTL has not been complied with within the prescribed period shall be treated as unjustified capital gains and included in the general taxable amount for the earliest tax year which has not yet become time-barred and may still be regularised. However, the provisions of this paragraph shall not apply if the taxpayer provides proof that the assets or rights held by him or her were acquired by means of declared income or income obtained in tax years for which he or she was not liable to that tax."

Meanwhile, Article 121 of the ISL, on the presumption of income from unaccounted for or undeclared assets and rights, provides:

1. "Assets held by the taxpayer which are not entered in his or her accounts are presumed to have been acquired by means of undeclared income. That presumption also exists in the case of partial concealment of the acquisition value.

2. Assets not entered in the accounts are presumed to belong to the taxpayer where he or she is in possession of them.

3. The amount of undeclared income is presumed to be equal to the acquisition value of the assets or rights not entered in the accounts, minus the amount of actual debts incurred to finance that acquisition, which are also not entered in the accounts. The net amount may not be negative under any circumstances. The amount of the acquisition value shall be checked against the relevant supporting documents or, if this is not possible, against the valuation rules laid down in the GTL.

4. There is a presumption of undeclared income where non-existent debts are entered in the taxpayer's accounts.

5. The amount of income established on the basis of the abovementioned presumptions shall be attached to the earliest tax year which has not yet become time-barred, unless the taxpayer demonstrates that it corresponds to one or more other tax years.

6. In any event, assets or rights in respect of which the obligation to provide information referred to in the 18th additional provision of the GTL has not been complied with within the prescribed period shall be regarded as having been obtained by means of undeclared income attached to the earliest tax year which has not yet become time-barred and may still be regularised. However, the provisions of this paragraph shall not apply if the taxpayer provides proof that the assets or rights held by him or her were acquired by means of declared income or income obtained in tax years for which he or she was not liable to that tax.

The general principle of the limitation period on taxes is established in Article 66 of the GTL, which sets the limitation period on the right of the Administration to determine and require payment of tax debt at four years from the expiry of the voluntary declaration or settlement period; and in Article 189 of the GTL, which also sets the limitation period for imposing tax penalties at four years from the time at which the corresponding non-compliance occurred. In contrast, in the application of Articles 39 of the IRPFL and 121 of the ISL, after their amendment by Law 7/2012, in practice there is no limitation period on the right of the Administration to regularise and penalise non-compliance with the obligation to report using "Form 720", given that the undeclared assets and rights are always attributed to the earliest tax year within the limitation period, such that the non-compliance will also be understood to have occurred within the four-year limitation period. For these reasons, the regulation of both taxes, in relation to the obligation to declare assets and rights located abroad, violates the general principle of a tax limitation period, set at four years, and grants the tax authority the power to regularise and penalise in such case without any time limits.

However, the requirement of legal certainty precludes public authorities being able to use indefinitely their power to end an illegal situation (Alarcón García, 2016). In this case, the Spanish tax authority may act without time limits and may ignore a limitation period which has already expired, simply because a taxpayer fails to comply with the formality of providing information on their foreign assets or rights by a given deadline. By attributing such serious consequences to a failure to comply with this reporting obligation, Spanish legislation chooses to go beyond what is necessary to guarantee the effectiveness of fiscal controls and combat tax fraud and evasion (Maroto Sifres, 2017).

2.3. The specific penalty regime

The 18th additional provision cited above also introduced a specific regime of infringements and penalties relating to non-compliance with the obligation to report via "Form 720", according to the following provisions: "It is a tax offence not to submit within the prescribed period the informative declarations provided for in this additional provision or to include incomplete, incorrect, or false information. It is also a tax offence to submit such declarations by means other than electronically, by computer and telematically where it is stipulated that such methods be used.

The above offences are very serious and shall be penalised in accordance with the following rules:

a) Failure to comply with the obligation to declare accounts held with credit institutions located abroad shall be liable to a flat-rate fine of EUR 5,000 for each data item or set of data relating to the same account which should have been included in the declaration, or for each data item which is incomplete, incorrect or false, the minimum fine shall be set at EUR 10,000. The fine is EUR 100 for each data item or set of data relating to the same account, with a minimum fine of EUR 1,500, where the declaration has been submitted out of time, without prior request from the tax authorities.

b) Failure to comply with the obligation to declare securities, assets, stocks, rights, insurance and annuities deposited, managed or obtained abroad shall be liable to a flat-rate fine of EUR 5,000 for each data item or set of data relating to each individual asset, depending on the category in question, which should have been included in the declaration, or for each data item which is incomplete, incorrect or false, the minimum fine shall be EUR 10,000. The fine is EUR 100 for each data item or set of data relating to each individual asset, depending on the category in question, with a minimum fine of EUR 1,500, where the declaration has been submitted out of time, without prior request from the tax authorities.

c) Failure to comply with the obligation to declare immovable property and rights in immovable property situated abroad shall be liable to a flat-rate fine of EUR 5,000 for each data item or set of data relating to the same immovable property or to the same right in immovable property which should have been included in the declaration, or for each data item which is incomplete, incorrect or false, the minimum fine shall be set at EUR 10,000. The fine is EUR 100 for each data item or set of data relating to the same immovable property or the same right in immovable property, with a minimum fine of EUR 1,500, where the declaration has been submitted out of time, without prior request from the tax authorities."

However, according to Articles 198 and 199 of the GTL, which determine in general terms the penalties applicable to taxpayers who fail to meet their reporting requirements, or who do so incompletely, out of time, or in the wrong format, failing to present a declaration in the set time will be penalised with a flat-rate fine of EUR 200, except for particular cases, or half that amount in the case of the taxpayer reporting late but without being told to do so by the tax authority. Meanwhile, the presentation of an incomplete, incorrect or false declaration will be penalised with a flat-rate fine of EUR 150, while the presentation of a declaration in the wrong format will be penalised with a flat-rate fine of EUR 250.

We can gather from the above that the amount of the flat-rate fines specifically established by the 18th AP are not in any way proportional to the amounts imposed on general taxpayers in

accordance with Articles 198 and 199 of the GTL, which should be comparable, given that they penalize non-compliance with equivalent obligations. According to the CJEU, this lack of proportion should be enough to demonstrate that the flat-rate fines established in this provision represent a disproportionate restriction on the free movement of capital.

As well as these flat-rate fines, it also provided that the laws governing each tax could establish specific consequences for non-compliance with the reporting obligation established in the 18th AP. Thus, a special penalty regime was established for cases of unjustified capital gains and the presumption of income relating both to the IRPF and to the IS, considered to be a very serious tax offence in these circumstances, applying a single proportional fine of 150% of the penalised unpaid tax.

Consequently, taking into account that the penalties with flat-rate fines regulated in the additional provision in question were incompatible with those established for general cases in the GTL, and that the penalties with a proportional fine of 150% imposed by the IRPFL and ISL were specific to these particular cases, it can be stated that ultimately there was a specific penalty regime for non-compliance with the obligation to report using "Form 720", different to the general penalty regime applicable to other taxpayers. The European Commission had previously ruled on this matter in the Reasoned Opinion-Infraction 2014/4330, issued on 15 February 2017 (https://www.fiscal-impuestos.com/sites/fiscal-impuestos.com/files/dictamen-motivado-ce-720-1.pdf), whose conclusions were already warning the Kingdom of Spain that the legal regime of the obligation to report foreign assets and rights, and its penalty regime, violated the principle of proportionality, were discriminatory, and were in conflict with multiple EU freedoms (Calvo Vérgez, 2021).

3. Transposition of the CJEU ruling to the Spanish national legal system

3.1. The CJEU resolution

Through the judgement analysed here, issued on 27 January 2022, the CJEU states that the Kingdom of Spain has failed to fulfil the obligations of Articles 63 of the TFEU and 40 of the EEA Agreement, specifically:

a) By providing that the failure to comply with or the partial or late compliance with the obligation to provide information concerning assets and rights located abroad entails the taxation of undeclared income corresponding to the value of those assets as 'unjustified capital gains', with no possibility, in practice, of benefiting from limitation.

b) By subjecting the failure to comply with or the partial or late compliance with the obligation to provide information concerning assets or rights located abroad to a proportional fine of 150% of the tax calculated on amounts corresponding to the value of those assets or those rights, which may be applied concurrently with flat-rate fines.

c) By subjecting the failure to comply with or the partial or late compliance with the obligation to provide information concerning assets or rights located abroad to flat-rate fines the amount of which is disproportionate to the penalties imposed in respect of similar infringements in a purely national context and the total amount of which is not capped.

For these reasons, the CJEU concludes that the disputed regime interferes with the free movement of capital guaranteed by Articles 63 of the TFEU and 40 of the EEA Agreement, insofar as its effect is to deter Spanish residents from transferring their assets abroad, when in reality there should be no objective difference between taxpayers resident in Spain depending on whether their assets are located in or outside Spanish territory.

3.2. Effects of the CJEU judgements

CJEU judgements are highly significant for the national legal systems of Member States, given that their courts and public authorities are obliged to apply them and consider them, in compliance with the principle of the precedence of European law. In Spain, according to the Spanish Constitutional Court, CJEU rulings become effective from the moment a law considered to conflict with European law comes into force, not on the date on which the CJEU ruling was issued,

such that they are fully retroactive; in other words, ex tunc (see Spanish Constitutional Court Ruling 145/2012, of 2 July 2012). Thus, the European Court itself has stated more than once that the rights of the citizens are not based on its rulings but directly on the European laws which are applied to resolve the cases, as they have a direct effect on the national legal systems of Member States (for example, see the CJEU Judgement of 14 December 1982, case 314/81, and the CJEU Judgement of 5 March 1996, case C-46/93).

Also, CJEU judgements annulling provisions of national laws because of conflicts with European law have an undeniable "debugging" effect on national legal systems, exactly like the constitutional reviews of the Member States themselves. But these pronouncements go beyond resolving conflicts between existing European and national laws: they also prevent the adoption of new state laws, insofar as these could go against EU law. To some extent, the judicial activity of the CJEU also favours the harmonisation of national laws, both negatively by purging legislation which conflicts with European law, and positively by establishing the limits of a kind of shared judicial framework.

In the words of Tomás Mallén (2017), the CJEU has gradually been configured as a "European Constitutional Court", not so much by the more or less formal or symbolic statements which it may have included in some rulings, or even by the dogmatic construction of fundamental rights through significant Praetorian efforts, but simply by constitutional powers which were first attributed to the original Treaties and have been consolidated through their reforms. And he states that although logically the emphasis is on the European Commission as the driver of the construction of Europe, it has been the CJEU which has secured the evolution and solidity of the EU as a "Community of Law".

3.3. Effects of the analysed CJEU judgement on the internal law of Spain

The statements of the CJEU in the analysed judgement have led to the following effects on Spanish internal law (Alarcón García, 2022):

1. The obligation for Spanish residents to report foreign assets and rights via "Form 720" is maintained, given that the information available to the national authorities relating to the assets held abroad by their tax residents is overall less than that available to them on assets held in Spanish territory, even taking into account the existence of mechanisms for sharing information or administrative assistance among Member States. For this reason, it is recognised that the disputed law is appropriate for these objectives.

2. In relation to the lack of a limitation period in cases of unjustified capital gains, the 5th final provision of Spanish Law 5/2022, of 9 March 2022, repeals Articles 39.2 of the IRPFL and 121.6 of the ISL, instead applying a general limitation period of four years to these cases, as provided in Articles 66 and 189 of the GTL. According to the repeated jurisprudence of the CJEU, the mere fact that a resident taxpayer holds assets or rights outside the territory of a Member State cannot be the basis for a general presumption of tax fraud and evasion (for example the Judgements of 11 March 2004, case C 9/02, and 7 November 2013, case C 322/11).

3. On the specific penalty regime for non-compliance and scenarios relating to the obligations of "Form 720", the 4th final provision of Spanish Law 5/2022 of 9 March 2022 repeals the second section of the 18th AP of the GTL, which established the specific regime of infractions and penalties of "Form 720", such that after the ruling, the general penalty regime of the GTL will apply.

4. The fine of 150% is considered excessively severe, and in many cases, given the addition of this fine to the flat-rate fines also envisaged, could lead to the total amount of the penalties exceeding 100% of the value of the unreported assets or rights. For this reason, the CJEU deems that the Spanish legislation causes a disproportionate restriction on the free movement of capital. The 4th final provision of Spanish Law 5/2022 of 9 March 2022 repeals the third section of the 18th AP of the GTL, which established the option of setting specific penalties for non-compliance with the reporting obligation of "Form 720" through the laws governing each tax, nullifying the penalty

of 150% introduced at the time by the 1st AP of Law 7/2012, of 29 October 2012, regarding the IRPF and IS.

5. As the effectiveness of the CJEU's judgements is ex tunc, i.e., they nullify repealed provisions from their time of creation, this means that all actions taken based on the repealed provisions are also nullified, and settlements and fines unduly paid on that basis must be reimbursed. Thus, any such settlements and fines which were appealed against and are not final must be annulled directly by the administrative or judicial bodies which are hearing the appeals. Meanwhile, those which have finalised will also generate the right to reimbursement for undue payments, including reimbursements on the motion of the Administration (for example, see the Spanish Supreme Court Judgement of 16 July 2020, rec. 810/2019) (Alarcón García, 2022). At the same time, if the Administration should refuse to recognise the right to reimbursement of unduly paid amounts or fail to reimburse them on its own motion, there could also be a path to the financial responsibility of the lawmaker State, even after the period indicated for this purpose has expired. On this possibility, there is an opposite CJEU Judgement of 28 June 2022, case C-278/20, which in fact declares that the regulation of the financial responsibility of the lawmaker State in breaches of European law goes against the principle of effectiveness configured by CJEU jurisprudence, which rules that it must be possible to exercise the subjective rights of EU citizens in conditions guaranteeing their full and effective realisation by the courts of the Member States.

Conclusion

According to everything discussed above, and to respond to the questions asked at start of this study, we can conclude the following:

First, the CJEU judgement analysed resolves that the regime for reporting foreign assets through "Form 720", introduced by Spanish Law 7/2012 of 29 October 2012, violates the basic principle of the EU on the free movement of capital. Due to this law, the treatment of Spanish taxpayers holding assets abroad was much more severe than for those holding assets in Spain, to the point of being disproportionate and against European law.

However, in relation to the legality of the obligation to report foreign assets using "Form 720", this obligation is maintained, given that the information available to the national authorities relating to the assets held abroad by their tax residents is less than that available to them on assets held in Spanish territory, and for this reason the disputed law is appropriate for these objectives.

As for changes to the legislation based on the analysed judgement, Spanish Law 5/2022 of 9 March 2022 repealed the specific penalty regime of "Form 720", relating both to flat-rate fines and to the proportional fine of 150% (4th final provision) and imposed a statute of limitations on unjustified capital gains in the IRPF and IS (5th final provision).

On the validity of actions, settlements and penalties based on reports made using "Form 720" before this judgement was issued and taking into account that CJEU judgements are effective ex tunc, i.e., fully retroactively, the settlements and fines unduly paid based on the repealed provisions must be reimbursed, whether they are pending decisions or finalised.

For all these reasons, this CJEU judgement is undoubtedly of great value for the Spanish national legal system, as it limits the abusive position of the tax authority, which treated taxpayers more severely for assets and rights located abroad than for those located in Spain. Thus, the European courts not only safeguard compliance with European law throughout EU territory, requiring national authorities to adapt their internal legislation; they also enable a degree of indirect harmonisation of national legal systems because their rulings must be followed by all Member States.

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ECONOMIC PERFORMANCE AND THE IMPLEMENTATION OF LEAN MANAGEMENT MODEL

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Abstract. *Objective: Understand how the increased competitiveness encourages industries to seek solutions in order to maintain or increase their market share, promoting the manufacturing of quality products at reduce costs.*

Methodology: In this study, an in-company analysis regarding the Lean performance evaluation methods present in the literature as well as already implemented in the industry was performed, focusing on the gaps of present models and needs for future.

Findings: New philosophies arise such as the Lean Manufacturing which is based on continuous improvement, aiming at optimizing the production system, eliminating waste and using fewer resources.

Value Added: Based on the results, and with the objective of allowing comprehensive assessment of Lean performance, independently by the companies and the determination of improvement actions, a Lean performance evaluation method was developed in order to understand the impact in financial and economic figures of the case study.

Recommendations: Take in account the main concepts of the social sciences, such as Organizational Culture, Leadership Style and Strategic Approach, considering the link with the financial economic performance.

Keywords: *Organizational Change; Organizational culture; Leadership; LEAN management; Application and performance model.*

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Introduction

Nowadays, a modern, competitive context is pressuring companies to achieve higher productivities with the lowest possible cost impact (Kokubu & Tachikawa, 2013).

Thus, few alternative methods have emerged, to support management decisions in terms of economic performances and, simultaneously, considering the product quality impact and production volumes (Kokubu & Tachikawa, 2013), (Sygulla, Bierer & Götze, 2011).

Under the current circumstances, a robust report supported in KPI´s is considered as one of the main tools for management and results improvement (Kokubu & Tachikawa, 2013).

Deployment of Economic performance indicators, is a management tool fostering the transparency of results reporting for process flows and Time Driven Activity Based Costing (Kaplan & Anderson, 2007).

This method has been developed to support industrial companies to increase the efficiency of Business Processes and to support management decisions by presenting the effective value of the company's waste.

Lean Management is recognised as a solution for waste elimination. Its main goal is the identification and elimination of several types of waste allowing companies to achieve an efficient customer demand (Spear, 2019).

Firstly, the deployment methodology is applied to an industrial system in a Portuguese company.

Then, to support the hypothesis of integration, the Economic and Financial Indicators and Lean management complementarities and gaps are primarily observed to identify improvement opportunities in manufacturing system during the Process Flow Cost Recording, (Romana & Gestoso, 2022).

Further, to support the hypothesis of integrate the indicators and Lean tools, their complementarities aspects and gaps of knowledge are studied based on scientific literature. Thereafter, a methodology to integrate the KPI´s reporting and Lean management, is presented and preliminarily validated with a case study (Romana & Gestoso, 2022).

Literature Review

The Process Flow Cost Recording is characterized for being a flow orientated accounting method that traces and quantifies in physical and monetary units all the material and added value cost flows. Furthermore, it compares the costs associated to the products and the material losses (Kokubu & Tachikawa, 2013). Once, the cost of waste is visible, it can drive managers to re-plan their strategy, understanding the impact on the economic and financial indicators (Romana & Gestoso, 2022).

As soon as their strategy is implemented, the resources reduction can be achieved and consequently a reduction of the overall production cost and economic impact (Schmidt & Götze, 2015). Thus, the deployment of indicators aims to support companies to enhance its financial and economic performance through the reduction of resources usage (Christ & Burrit, 2016).

The original concept of the strategy and management indicators linkage was been developed in 2004 at "Harvard Business School", USA. Posterior few pilot projects were initialised in the world industry. Nevertheless, the first breakthrough of the method was accomplished in Japan, by Toyota.

Due to the successful results of the first implementations the methodology was enhanced and published in September 2011 as ISO14051 included in Cost Accounting procedures (Sygulla, Bierer & Götze, 2011), (Guenther, Jasch, Schmidt, Wagner & Lig, 2015).

Methods

2.1. Principles and Fundamentals of indicators deployment

The Process of deploying indicators method divides the entire production system into responsibility levels. The m levels are parts or sub-divisions of the management system where the inputs and outputs must be quantified in physical and further in monetary units.

Usually, these areas correspond to places where materials are transformed, or stocked (Kaplan & Anderson, 2007).

The management levels are the starting point for data collection in physical units in terms of resources measurements.

Considering this principle, and to guarantee that all the flows are accounted, a mass balance should be performed to the production system per each area individually.

The system of indicators management considers the production of goods as a system of integrated report, based on the mass balance. It distinguishes the movements of materials in (Sygulla, Götze & Bierer, 2014): (i) Desired material flow – Movement of material that intend to

become part of the final product; (ii) Undesired material flow – movement of unintended materials output.

The Process application method must be considered as a step by step procedure. Its implementation in a production system can be performed based on the following steps (Kaplan & Anderson, 2007):

1. Selection of the indicators to analyse;
2. Definition of boundaries and time period of analysis;
3. Determination of the measured items;
4. Quantification of material and added value flow in physical units;
5. Quantification of the previous flows in monetary units;
6. Identification of Inputs and Outputs;
7. Develop a calculation model which compiles the collected information;
8. Communicate the results to the company's managers;
9. Process Flow Cost Recording summary and interpretation.

Since, any production process requires several types of inputs, the analysis should consider all the costs involved on it. Consequently, the flow cost which have to be assigned to the material's flow (physical units) include all costs which can be related or are caused by the material flow (Kaplan & Anderson, 2007).

Process of economic report divides the several types of cost into: (i) Material cost, (ii) Energy cost; (iii) System cost; (iv) Waste management Cost.

The system cost includes the cost of 'all expenses incurred in the course of in-house handling of the material flows, except the material, energy and waste management cost (Kaplan & Anderson, 2007).

Thereafter, a calculation model should be developed to compile all the information required resulting in a Process flow map. Further, the flow map should be presented and analysed by the company's managers to seek for improvements (Kaplan & Anderson, 2007).

The flow map is the final output of the Process Flow Cost Recording analysis it presents the economic flow based on the resources consumed in each area of reporting. It is divided in indicators and then each indicator is sub-divided in Input cost, Energy and System cost and outputs which in turns differentiate the product and material waste cost, which can allow the management in order to obtain the best KPI´s value (Romana & Gestoso, 2022).

2.2. Organizational Development and Change Project

The program called "Organizational Development and Change Project" (Kotter, Reeves, Love & Tillmans, 2019), was the model chosen by top management as a way of ensuring the necessary change process, as well as complying with the activities.

The model to be developed is supported by three fundamental pillars, which allow its development in phases, considering the permanent monitoring and evolution: (i) Management System - Consolidation and Sustainability; (ii) Themes: Context, stakeholders, leadership and strategy; (iii) Global Philosophy of Lean Management (Womack & Jones, 2014) and (Lopes, 2016).

2.2.1. Management System - Consolidation and Sustainability (context)

Considering that we intend to be an Innovative organization that continuously learns, we intend to develop the EFQM model from a theoretical point of view and then apply improvement and management actions in each of its aspects in order to promote and evaluate permanent and continuous improvement.

We then describe the model from a generic point of view, then highlighting the improvement actions chosen by the company's top management, considering the connection of the functional areas to the points dealt with in the respective activity plans described in point 2.1.

In the specific case study, top management conducted its action and follow-up priorities in the same intervention logic, highlighting actions in terms of direct intervention in (i) leadership training (moving to intermediate levels) (ii) policy definition and strategy (unfold and continue with

functional areas) (iii) redefinition and management of business processes (LEAN implementation work) (iv) performance indicators (follow-up and performance using the ScoreCard).

Lean Manufacturing is based on the principles of the Toyota Production System, which focus on the need to manufacture a product whenever the customer needs in the quantities he needs, allowing the disposal of finished products. Womack and Jones (2018) outline the five concepts of Lean Manufacturing that make their application easier and more intuitive in different industry types: Specify the Value, Identify the Value Stream, define a Continuous Flow, Implement Pull Production and Seek Perfection. There are several Lean fundamentals and tools, such as Kaizen and Muda, Mura and Muri.

2.2.2. Continuous Improvement (Kaizen)

The word Kaizen is divided into two Japanese terms: Kai - meaning change and Zen - which means to do better Womack and Jones (2016). The concept of continuous improvement should encompass all employees of the organization, from operator to leadership. According to Imai [5], the Kaizen philosophy consists in a continuous process with small low risk changes which will translate into great results on the long term. The PDCA cycle, also called the Deming Wheel, represents the successive stages of continuous improvement process Womack and Jones (2018): Plan (identification and analysis of the problem), Do (development and implementation), Check (analysis of results) and Act (standardization of the successful process).

2.2.3. TPS House

Lean Manufacturing is based on the TPS model, visually represented by the TPS House. The fundamentals of the house are the Standardization, which is the process of developing and regularly implementing uniform and easily repeated concepts, methods and operations, adapted to the design of different products, also related to Heijunka; and the Stability which is related to the operational consistency of the equipment, the organization of the space, the permanent alignment with objectives, and the purpose and mission disseminated in the company. The pillars are Just-in-Time (JIT) and Jidoka. JIT consists of Pull Production which is "pulled" according to customer demand, related to continuous flow on the production line. Jidoka focuses on the causes of the problems and their resolution, on the quality of the process, on the minimization of variability and rapid response to nonconformities. In the centre there is the Involvement which consists on the existence of flexible and motivated teams that work with the common goal of continuous improvement. The main focus of TPS House is to maximize quality, while minimizing cost and production time as well as eliminating waste in order to meet Customer needs. In addition to the product, the Customer considers the safety at work and the motivation of the employees (Womack and Jones, 2016 and 2018).

2.2.4. Muda, Mura and Muri

One of TPS's principles is the reduction of wastes (Muda, in Japanese). All activities that do not contribute to the value of the product are considered waste. According to Womack and Jones, the Muda is associated with activities such as waiting and delays, product defects, poor processing, excessive production and inventory, poorly optimized transport and operator movement, and the inadequate use of employees' talent. Taiichi Ohno divided the Muda into seven distinct categories: Transport, Movement, Waiting, Defects or Rework, Processing, Overproduction, and Inventory. Later, another type of Muda was added: Talent, which involves the optimized use of the collaborators' capabilities (Womack and Jones, 2016 and 2018).

In addition to these eight types of Muda, there is also the waste whose elimination does not involve benefit for the company: Unevenness (Mura) and Overburden (Muri). Mura represents the unequal distribution of labour due to, for example, delays in previous production steps and poor planning of production. Muri represents the overburden of equipment and operators (Womack and Jones, 2016 and 2018).

2.3. Lean Methods and Vocabulary In order to implement the Lean Manufacturing philosophy it is necessary to use several tools and methods to identify and reduce waste. Some of the most common methods and vocabulary used in Lean philosophy are:

Kanban system: a visual production control system that facilitates JIT implementation; 5S: focusing on keeping the workplace clean and organized, it is divided into five concepts: Seiri (Selection), Seiton (Organization), Seiso (Cleansing), Seiketsu (Systematization) and Shitsuke (Discipline); Poka-Yoke: a system to prevent errors and defects; SMED (Single Minute Exchange of Die): a setup time reduction technique; Work in Process (WIP): work that was started and has not yet been completed; Lead Time: time spent from the beginning to the end of the process including processing time and waits; Takt Time: time available to manufacture a product based on customer demands; Overall Equipment Effectiveness (OEE): indicator of equipment efficiency; Total Productive Maintenance (TPM): process which ensures the correct maintenance of equipment, assigning responsibility to operators; Go to Gemba: Gemba is a Japanese term meaning "the real place", which represents the space where production work is carried out; Kaizen Events: small group reunions to discuss about the areas which need improvement actions; Value Stream Mapping (VSM): detailed map with the materials' flow and information at all stages from the beginning to the end of the manufacturing process.

Although it is known which tools are necessary in order to obtain a competitive advantage on the market, it is necessary to clarify how to classify a company according to its performance in Lean. It is important to understand what the current state is and what the desired Lean level is. In addition, it is necessary to understand which key dimensions should be evaluated and how to evaluate them (Womack and Jones, 2016 and 2018).

Results

According to (Cameron, Quinn & DeGraff, 2006), the implementation of a management model will lead management to a leadership style conducive to creating value and obtaining results in terms of quality, human and financial capital, based on effective organizational performance.

Development and implementation of the strategic plan: Strategic Map, Strategic Actions and Objectives, hitherto non-existent.

Activity Plan: Annual objective, strategy implementation maps, breakdown by functional areas and documents related to the strategic plan, which allow the common orientation of management units, such as (i) Market Studies; (ii) Business Plans; and Quality Plans.

Change and organizational development project according to Kotter (2008), was the model chosen by top management as a way to guarantee systemic implementation, based on the following pillars of action: (i) Top management actions; Definition of Objectives; and (iii) Implementation Practices, supported by the change in the Company's Culture (Values and Behaviour).

Management System - Consolidation and Sustainability (context), the systemic thinking of Katz and Kahn (in Grant, 2012), through the open systems model, show the general environment and the organizational context creating the functioning process through the inclusion of resources until the production of "outputs", modified by the elements that characterize the context, such as: (i) Culture; (ii) Objectives and Strategies; (iii) Behaviour; (iv) Processes; (v) Technology; and (vi) Structure. In our localized approach to the EFQM model.

In terms of results of the study, we analyse the evolution of the economic and financial indicators, the first table, but mainly the link between the operational indicators and the economic and financial indicators that translate into a consequence of the good performance of the previous ones, being this is the basis for the main research hypothesis in the case study.

The evolution of the treated economic and financial indicators is clearly the consequence of the operational indicators as we can see in the company reports, in which the evolution of values is located in the stock rotation (3.2%); Working Capital (4.65%); EBITDA margin (15.6%); and Net Cash Flow (46.7%), Table 1 and 2.

Table 1
Macro Key Performance Indicators

KPI	Value
Stocks Turnover	3,2%
Working Capital	4,65%
EBITDA Margin	15,6%
Net Cash Flow	46,7%

Source: Company reports data

Table 2
Operational effect on Macro indicators

KPI	Value
Stocks Turnover (Production & Logistics)	Inventory Reduction
Working Capital (Controlling)	Stocks, Collection and Debt
Customer Service (Business, Quality and Marketing Directions)	Complaints, Delivery Time, Brand Image, New Solutions, Visiting and Listening
EBITDA Margin (All areas)	Efficiency, Working Times, Standards and Rework
Net Cash Flow (All areas)	Sales, ideas instead of investments and all cost savings

Source: Company information reports

Table 1 explains the improvement in results during the period under analysis, using the management indicators considered adequate, for the development of the business and evaluation of the company's performance.

Thus, it refers in the first column to the designation of the indicator in question and in the second the value relative to the percentage improvement obtained.

The management indicators are described in the results and were listed according to the following:

- Stocks turnover;
- Working Capital;
- EBITDA Margin;
- Net Cash Flow.

As we will be able to understand these indicators, they are the consequence of operating at the operational level, for this purpose, we elaborated table 2, which allows us to understand the unfolding of the indicators, from the macro to the operational level, being that the macro is considered the strategic level (Kaplan & Anderson, 2007).

Thus, in table 2 we report the macro indicators in the first column, also referring to the responsible areas and in the second column, the activities related to each indicator that allow results to be obtained at the operational level and which will then have an economic and financial consequence.

In the operational column, we are clearly talking about activities and indicators related to the LEAN Management philosophy, in the left column we report economic and financial indicators,

which will be the consequence of the actions mentioned above, in order to assess the impact of Lean implementation on company results (Shook, 2019).

The clear implication in the creation of value comes from good operational management, in order to reflect the results of the actions, in the return results for the shareholders, represented by the Working Capital, EBITDA and Net Cash Flow indicators (Emiliani, 2007).

Discussion

The phased implementation, with the creation and development of pilot areas, is particularly beneficial for the organization's culture, also interesting for the involvement of people and the cascading communication process.

The company's entry into "way of life" when defining long, medium- and short-term improvement cycles, in which the use, according to (Basu, 2011), of the DMAIC and PDCA cycles is important in an integrated and complementary way, through the Lean tools.

According to (Kaplan & Norton, 2019) the use of the Balanced ScoreCard allows the organization and correct allocation of management indicators, thus ensuring their correct and effective follow-up against the objectives.

Improvement of the global EFQM index by 35%, going from 540 to 730 points in one year.

Implementation of the corporate risk management model based on five pillars: (1) Market risk; (2) Credit risk; (3) Operational Risk; (4) Legal risk; and (5) Information Systems Risk (Kendall, 1998).

Development of the model considering the Stakeholders: Customers and Shareholders, deriving for the creation of value, which according to Black, Wright & Bachman (2008) is obtained with the definition of objectives in all areas of the company, solving problems, optimizing business processes and involving teams with the appropriate means. According to Cameron, Quinn and DeGraff (2006) the strength of value creation comes from the performance model and the achievement of objectives, through LEAN transformation (Shook, 2019).

Strongly active behavioural performance of top and middle management, according to (Quinn, 2011), transition from normal state to the fundamental state of leadership.

Management of skills, knowledge and talent, providing the success of teams (Cascão, 2014).

Strategy and Deployment: always associated with the business chain supported by the axes of diversity and segmentation, in marketing policies and in the established criteria, such as the distribution network in geographic terms (Kotler, 2014).

Table 3
Competitiveness Key Performance Indicators

Indicador	Valor
Processes Cost Reduction	45%
Reduced product and project development times	60%
Engineering capacity increase - new projects	40%
Improved customer satisfaction – NPS – Net Promoter Score	80%
Processes Cost Reduction	

Source: Company Data

Company competitiveness - supported by cost optimization of internal business processes considering the categories of: (i) Excess stocks; (ii) Rework operations; (iii) Waiting Times; in

addition to the budget deviations that represented (27.9%) of the deviations in costs, this being one of the opportunities for rationalization.

Implementation of quality cost analysis, in four categories: (1) Prevention (35%); (2) Evaluation (25%); (3) Internal failures (30%); and External Failures (10%).

Leadership Behaviour, according to Shook (2019), should be focused on management by example, having all people involved and committed, putting knowledge ahead of "I think that", instilling the principles of continuous improvement, conducting tests before opting for solution to the problems or needs of the markets, creating trust in teams and people, developing mutual trust, developing people before products, doing all this and dealing with the day to day functions.

Analysis of the data and results of the management indicators, which according to (Hejazi 2015), were divided into categories: (i) Competitiveness (with changes between 40% and 80%), whether qualitative or quantitative; (ii) Operational, Economic and Financial (with changes between 3.2% and 46.7%), supported in table 3 by the competitiveness key performance indicators.

The capacity to create value and develop new management methodologies, based on the LEAN philosophy, allowed the evolution of the organization's results according to the expected and defended in the literature, considering the implementation of a strategic and operational plan (Grant, 2016); the clear and negotiated definition of objectives transversal to all functional areas and behavioural changes in terms of the state of leadership, with the transition from the normal state to the fundamental state of leadership (Quinn & Thakor, 2019). Thus, we understand the qualitative evolution, provided by the results of the evolutionary evaluations of the EFQM model and the quantitative evolution understood by the evolution of the economic and financial indicators, which we were able to summarize in the improvement of the EBITDA margin to (15.6%).

Conclusion

The initial process of implementing the LEAN management philosophy in the company, allowed us to understand that the main objective of the performance, in this context, would be the creation, development and application of a management model adapted and appropriate to the organization, which should be based on the LEAN system, integrating several tools and concepts that would allow it to be present at the forefront of current management (Romana, 2014).

Given the growing demand of the markets, the introduction of new and more demanding customers and the most effective approach in terms of quality.

The stronger penetration in the international area of the business, agricultural and transport units, and of course the acquisition of customers in the current business, connected with the automotive industry and markets, also created the need to evolve at all levels of activity.

With the implementation of the Management Model, which at the beginning of the journey, we had no idea that we could move forward in this direction, we concluded that the modular and systemic logic allows us to verify that:

All organizations, their teams and all people need a defined path to be motivated in the pursuit of common goals (Shook, 2019) and (Womack and Jones, 2016).

The fundamental tools or elements for the definition of common objectives is the definition of the strategy through the creation and development of strategic, coherent and participatory maps.

The consolidation of the strategic maps must be carried out in a management medium that is the strategic plan, based on valuation and rationality in the budget and business plans (Kaplan and Norton, 2016).

According to (Grant, 2019) it is essential that the strategies supported by the motivation of people and in the definition and follow-up of objectives, be implemented by appealing to what are called successful strategies through the capacity for execution, by the functional areas.

Areas in which the priorities for action are defined, the strategies to be developed, the target areas of action, indicators for measuring progress and objectives, according to Grant (2002), allow the success of the implementations.

Risk Analysis and Initial Diagnosis - the involvement of the most experienced teams in this phase was crucial to define the main problems and opportunities for improvement, according to (Shook, 2019), (Womack and Jones, 1996).

The holders of the tasks in the various processes, are the most knowledgeable about their difficulties, then if they know how to solve it, it is another topic, for that we had to change.

Organizational Change and Development Project, was developed and implemented based on the following aspects: Management System - Consolidation and Sustainability (context); Implementation methodology in phases, designating pilot areas and then expanding to the entire organization; Move forward with improvement cycles, as a form of common action across the company, allowing us to instill the spirit of continuous and permanent improvement, throughout the entire value chain; Follow-up Model - based on the "Balanced ScoreCard" tool, and highlighting the four perspectives of management indicators (financial, customers, internal processes and learning and growth), allowing to raise the level of management performance, the integration between areas and the improvement of reference values; and Evolution according to the EFQM model, which allows us to measure and monitor qualitative and quantitative improvements over time, in addition to technical and behavioural aspects;

We arrived here at the Lean Model (MGG) through the program called "LEAN Transformation", based on the implementation of the PDCA and focused on the basic triangle of performance (Purpose, Processes and People), improving management indicators by values between 25% and 50%, from productivity, material flows and information flows.

We carry out the assessment of LEAN implementation levels, according to the MIT Model (LAI - LEAN Advancement Initiative), through the six parameters of the defined scale: (1) Involvement of People; (2) Value Creation; (3) Value Chain; (4) Process Flow; (5) Notion of "PULL"; (6) Perfection Index, obtaining (66%) the level of implementation, considering the scale we will have more (34%), opportunity for improvement.

The Behavioural Performance, was and is being supported in the development of the leadership capacities of all the coordinators and directors of the company and in the management of competences, knowledge and talent of all people, through "Coaching" actions that are methodologically based. develop based on cycles of experimentation, training and the practice of processes. The "KATA Coaching" Improvement cycles, according to (Rother, 2009), are based on the Production Management System quadrants created for the company and on the process flow optimization tools.

Leadership - it is a subject with treatment and particular importance in this transformation process and in the specific case through changes in the shareholder body, in the generation change and mainly by the inclusion of the professional management team. In fact, the transition from leadership status in most functional and operational teams was also promoted, as mentioned (Quinn, 2011), from the normal state to the fundamental state, seeking a focus on teamwork, joint coordination and cohesion, centred on others and not on themselves, being more oriented towards customers and flexibility to the detriment of internal focus and only in control activities. The leadership approach is considered in a value chain, as a model for the management and monitoring of the evolution of the company's processes, supported by the leadership's action plan that concretely acts in the strategic, tactical and operational variants, always managing the flow of creation of value: (i) productive; (ii) materials; (iii) information.

Strategy and Deployment - We believe that the best solution would be to address the topic under three fundamental points of action and implementation: (1) The business chain, based on the concepts of diversity and segmentation of markets and Ansoff products in (Kotler, 2014), including a geographical criterion; (2) Competitiveness of the company, through good management of inventories, costs and waste of activities; (3) Quality, improving Prevention and Evaluation procedures, managing and following internal and external failures, naturally centred on customer complaints and non-conformities of processes.

Management Indicators that naturally allow us to follow the evolution of results and simultaneously stimulate the setting of objectives, indicators for measuring competitiveness, both

quantitative and qualitative, as well as operational, economic and financial indicators were developed. We also changed the company's management posture here at all levels, considering the contribution of people and areas to the overall results. It reflects the strategy unfolding, embodied in its valuation and follow-up, through the integrated monitoring elements, supported by the ScoreCard model (Basu, 2019), integration of management tools.

We definitely concluded that modern management systems can adapt to century-old organizations and work in perfect coexistence with the experience demonstrated over time, considering that the critical success factors are based on the formation and transformation of leadership styles, in implementation in phases and the good communication of the programs (Mann, 2016).

Future Research Lines

Naturally, we understand some limitations in the study, as it is a specific case and in which there was a strong capacity and opportunity for improvement. Thus, we defined as future lines of research, two fundamental and converging options, which would be the possibility to compare the results over time with other industrial organizations and apply the study methodologies to companies in non-industrial sectors, such as logistics and services (Romana, 2016).

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PROVIDING HIGHER EDUCATION INSTITUTIONS IN THE REPUBLIC OF MOLDOVA WITH ACADEMIC STAFF: PROBLEMS AND PERSPECTIVES

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Abstract. *The defiance of higher education institutions with the retention of qualified academic staff, lately, continues to be a strident one for the vision of development and prosperity in the educational services market.*

The authors, in the presented research apply the comparative analysis of the scientific-didactic staff according to the criteria: age, didactic norm, didactic and scientific degree for the years of study 2015/2016 and 2021/2022 in the higher education institutions of the Republic of Moldova in order to identify the problems faced by HEI. The basis of the results obtained, priorities and perspectives of employment and improvement of the existing situation were formulated.

The competitiveness of academic staff is becoming a key factor in the modern educational process.

Keywords: *higher education, academic staff, education, qualified staff.*

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Introduction

The level of development of countries in the modern world is determined by the intellectual potential it holds. The role and importance of higher education in political, social and economic life can hardly be estimated. Not by chance, higher education is today considered one of the main values, without which the further development of society is impossible.

The educational system in the Republic of Moldova, as well as the global one, during the COVID-19 pandemic crisis, faced challenges such as: globalization, diversity of software products, implementation of large-scale technologies in the educational process, developing more and more activities and jobs that require more knowledge and training in the field of information technologies (De Waal & Kerklaan, 2015).

The services in the contemporary world are based on quality educational systems, able to respond to these challenges, while developing the need for human empowerment, by acquiring the knowledge and skills essential for building a modern society.

Education allows society to interpret the world around it, in the correct way, innovating new ways and means to conform to the environment, generating opinions on economic and social life.

The subject of the study is the structure of the didactic-scientific staff in the higher education institutions of the Republic of Moldova, and the subject of the study is the priorities and perspectives of employment and improvement of the existing situation.

The purpose of the study is apply the comparative analysis of the scientific-didactic staff according to the criteria: age, didactic norm, didactic and scientific degree for the years of study 2015/2016 and 2021/2022 in the higher education institutions of the Republic of Moldova in order to identify the problems faced by HEI. And the reseach of the study is the identifications priorities and perspectives of employment and improvement of the existing situation were formulated.

Literature Review

According to the organization's theory, qualified personnel are a key factor in the development and prosperity of organizations including HEI, which in turn through long-term financial investments can be motivated and guided to advance in the career. A qualified didactic-scientific staff is a promoter of didactic-scientific activity, research, innovation, and reform measures. Unfortunately, it is found that the teaching profession does not enjoy success among high school graduates (Negura, 2018). This phenomenon can be explained by the absence of state policies in the process of attracting, training and perpetuating qualified teaching staff in the educational system.

The education system in the Republic of Moldova, in the last two decades, is engaged in a series of ambitious reforms and faces obstacles of different sizes. With reference to the academic staff, there are numerous problems of attracting, training and perpetuating it (TîrȘu, 2021; Banari & Beldiga, 2021)

- number of those willing to practice a teaching career decreases drastically;
- situation and economic instability;
- devaluing the image of a teacher, as a result of demining the importance of education in society;
- unattractive remuneration.

The employment of academic staff in the Republic of Moldova is regulated by the following legal norms:

- Code of the Republic of Moldova: Article 118. Filling the didactic, scientific-didactic and scientific positions (The education code of the Republic of Moldova, 2014).
- Labor Code of the Republic of Moldova: Chapter XI. Work of employees in education and in organizations in the field of science and innovation. Articles 296 to 301 (The Labor Code of the Republic of Moldova, 2003).
- GD no. 616/2016 elaborated by the National Agency for Quality Assurance in Education and Research (ANACEC) and approved by the Government (Decision nr.616, 2016).
- Internal regulations, Regulations regarding the occupation of didactic / scientific-didactic positions and the conferring of scientific-didactic / honorary titles (Technical University of Moldova. Legislation, 2022).

The purpose of this paper is to understand the challenges faced by higher education institutions (HEI) in the context of academic staff and to identify solutions to prevent underdevelopment and insufficiency of qualified teaching staff. Because, according to the data presented by the National Bureau of Statistics of the Republic of Moldova, the number of scientific-didactic staff in HEI decreased by 37% in the academic year 2020/2021 compared to 2010/2011 (National Bureau of Statistics of the Republic of Moldova, 2022).

Respectively, the identification of the employees' expectations regarding the working environment is a critical issue in the ability of the HEI to keep the teaching staff. In this respect, the current state of the Moldovan university system is of scientific and practical interest and requires a comprehensive study.

Methods

The literature in the field specific to the proposed research was analyzed with the aim of evaluating and analyzing the most relevant visions.

The present study was elaborated based on the data provided by the National Bureau of Statistics of the Republic of Moldova for the academic years 2015/2016 and 2021/2022.

The results were obtained by applying dynamic process analysis, comparative analysis, classifications, synthesis, analogy, various statistical methods, graphical representations and tabulation, etc. The representation of the data was performed with the MS Office Excel program.

Results

The conjuncture of contemporary society has become much more complicated due to the pandemic crisis. The crisis period was marked with the avalanche of the implementation of new technologies and information opportunities that were adopted unannounced. This period, the educational services offered by universities have undergone essential changes. Previously, university institutions were recognized not only as a place where lectures are held, but also as a location associated with social communication between a teacher and a student. This process has become more flexible and complex. In a new vision in which basic definitions take on a new form, accreditation and quality assurance in educational institutions have become particularly important tools. What is happening today in universities is a demonstration and a particular case of a paradigm shift in human life in a new technological order, a post-industrial society. We live in a world where information and information technologies have become the basis of human life. Now there is also a palpable requirement of a whole new culture of the functioning of the entire human society as a whole and of specific people who, in order to be perceived at the level of public opinion as cultural representatives of society, must have a completely different set of skills. What happens in academia is a reflection of the whole process and, as is often the case, takes somewhat exaggerated forms that go beyond the norms established in society. It is very important to note that today's education is not only about the transfer of skills or a set of knowledge, but also this process of transmitting knowledge is negatively determined by the lack of a cultural community in universities, the contingent of teachers and students is too heterogeneous. In this regard, the transfer of knowledge in the classic format of teacher-student communication is outdated.

Currently, the higher education system in the Republic of Moldova is in the process of development and optimization. Every year, the requirements for a teacher are increased and require the teacher to correspond to the following performance indicators:

- didactic activity – direct contact hours;
- methodical activity - by publishing methodical-didactic works, by elaborating institutional and classical tests, placing the teaching material on different educational platforms, etc.;
- scientific activity – publication of articles in scientific journals, participation in various conferences, symposiums, etc.;
- community activity – activities in projects, participation in different tracksuits / seminars / professional training activities, etc.

The specific characteristics of the pedagogical activity include a set of communication and interaction links, the constant need to make decisions, the detection of constructive ways of conflict resolution, etc. Thus, all the requirements towards the teacher create a constant tension that results in a decrease in the capacity to work, physical fatigue, disappointment and emotional exhaustion are often a decisive factor in the decision of the teacher to abandon the pedagogical activity. On the other hand, the training of qualified and permanent teaching staff in HEI is a necessary condition for long-term survival of HEI. The lack of qualified teaching staff limits the development of national or international investment projects, as well as the development of innovation sectors.

In order to identify the existing situation in the HEI in the Republic of Moldova, the analysis of the scientific-didactic staff was carried out according to the following criteria:

1. by age group;
2. according to the form of employment: holders or external accumulation;

3. basic staff according to the full or partial teaching norm;
4. basic staff according to the scientific degree and didactic title.

Based on the analyzed data, the academic staff under the age of 40 in the academic year 2021/2022 indicates 23.66% of the total number of employees and recorded a negative dynamic of 13.9% compared to the academic year 2015/2016 (Table 1).

Table 1
Scientific-teaching staff classified by age categories

Age, years	Scientific-didactic staff, persons								Total	
	Professor		**Associate Professor**		**University lecturer**		**Teaching staff**			
	2015/ 2016	2021/ 2022	2015/ 2016	2021/ 2022	2015/ 2016	2021/ 2022	2015/ 2016	2021/ 2022	2015/ 2016	2021/ 2022
under 30	-	-	3	-	198	9	144	130	345	139
30 - 39	4	1	203	144	978	173	252	471	1437	789
40 - 49	25	18	467	527	512	261	110	428	1114	1234
50 - 59	48	49	413	411	271	100	43	196	775	756
over 60	261	264	566	509	222	89	23	142	1072	1004
TOTAL	338	332	1652	1591	2181	632	572	1367	4743	3922

Source: elaborated by the authors on the basis of the data provided by the National Bureau of Statistics

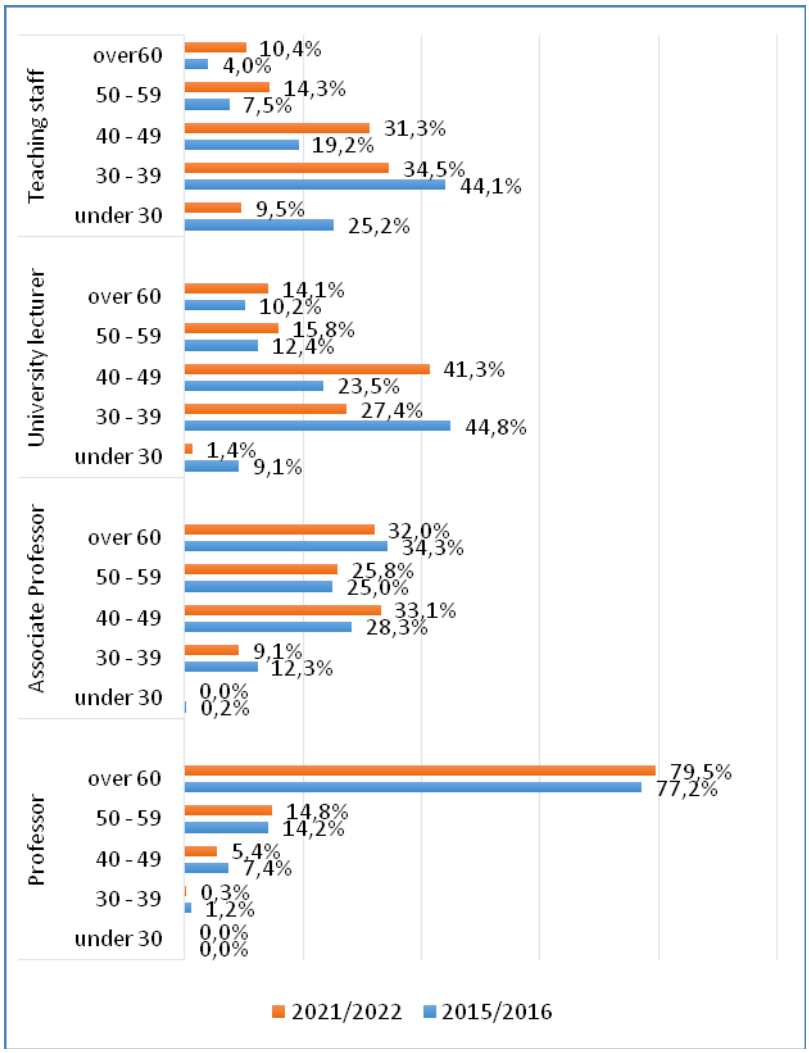

Figure 1. The structure of the scientific-didactic staff in percentages for the academic years of studies 2015/2016 and 2021/2022

Source: elaborated by the authors

According to the results reflected in Figure 1, it is found that the number of employees classified by age categories during the years 2015-2022 differs from one category to another. At the same time, it is established that in the academic year 2020/2021 the scientific-didactic staff of the HEI in the Republic of Moldova decreased by 821 compared to the reference period. With regret, the decrease is also evident in the age category under 39 years, which indicates that the provision of scientific-didactic staff in all categories aged up to 40 years is a difficult subject for HEI.

Table 2 represents the teaching-scientific staff classified by age group. According to the calculated share, it can be identified that teachers under the age of 30 constitute 3.54%, registering a decrease of 3.73% compared to the academic year 2015/2016.

The decrease in the number of scientific-didactic staff aged up to 39 years emphasizes that young specialists are not attracted to the teaching profession, being influenced by several factors such as, for example, the low salaries in this field of activity, the lack of promotion of the role and impact of this profession in the economy, society, etc.

On the other hand, the share of teachers in the age categories 50-59 years and over 60 years, who represent people with the age limit for retirement, is 19.27% and 25.59% respectively. It should be noted that the exit of the given group of people from the educational system risks generating a shortage of discernible teachers.

Table 2
The pace of change of the scientific-didactic staff, by age in the academic year 2021/2022 compared to the academic year 2015/2016, %

Age	Professor (%)	Associate Professor (%)	University lecturer (%)	Teaching staff (%)	Total (%)
under 30	0,00	0,00	-95,45	-9,72	-59,71
30 - 39	-75,00	-29,06	-82,31	86,90	-45,09
40 - 49	-28,00	12,85	-49,02	289,09	10,77
50 - 59	2,08	-0,48	-63,10	355,81	-2,45
over 60	1,15	-10,07	-59,91	517,39	-6,35
Total	-1,78	-3,69	-71,02	138,99	-17,31

Source: developed by the authors based on the data provided by the National Bureau of Statistics

According to the data presented in Table 2, it can be mentioned that the total number of scientific-didactic staff in the academic year 2020/2021 compared to the reference period decreased by 17.31%. The decrease of the scientific-didactic staff was registered approximately in all age categories except for the age of 40-49 years where there is an increase of 10.77%. This increase is due to the lack of young teaching staff and the aging process of existing academic staff.

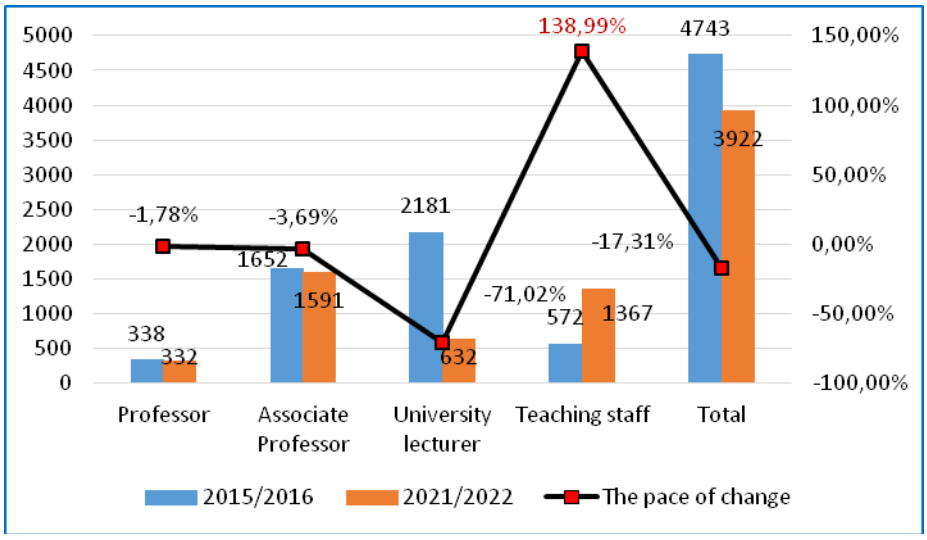

Figure 2. Tenured scientific-didactic staff for a. y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

Analyzing the scientific-didactic staff by types of employment: titular (Figure 2) or external accumulation (Figure 3), it is attested that for both forms of employment there is an increase in the number of staff only in the category of teaching staff: holders with 138,99% and 203,53% external cumulated, respectively. This increasing trend of teaching staff can be explained by applying the Education Code of the Republic of Moldova no. 152 from 17.07.2014 (The education code of the Republic of Moldova, 2014) and the Framework Regulation on the organization, conduct of the competition and occupation of teaching and scientific-didactic positions in higher education (Technical University of Moldova. Legislation, 2022), approved by MECC Order no. 126 of February 10, 2021 (Ministry of Education, Culture and Research of the Republic of Moldova, 2021). According to these normative acts, the teachers who do not hold the title of Doctor of Sciences from the category of university lecturer were transferred to the category of teacher.

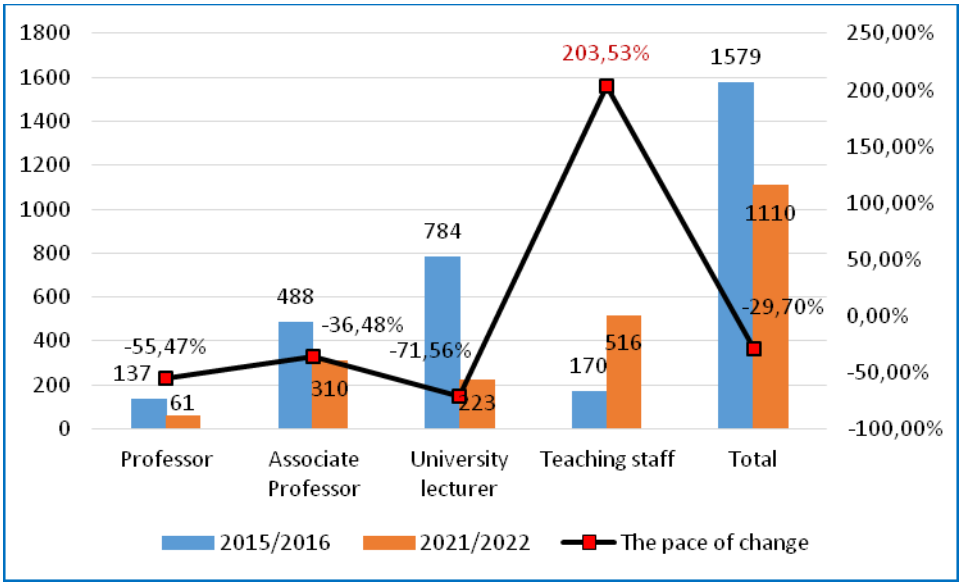

Figure 3. Scientific-didactic staff external accumulation for a. y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

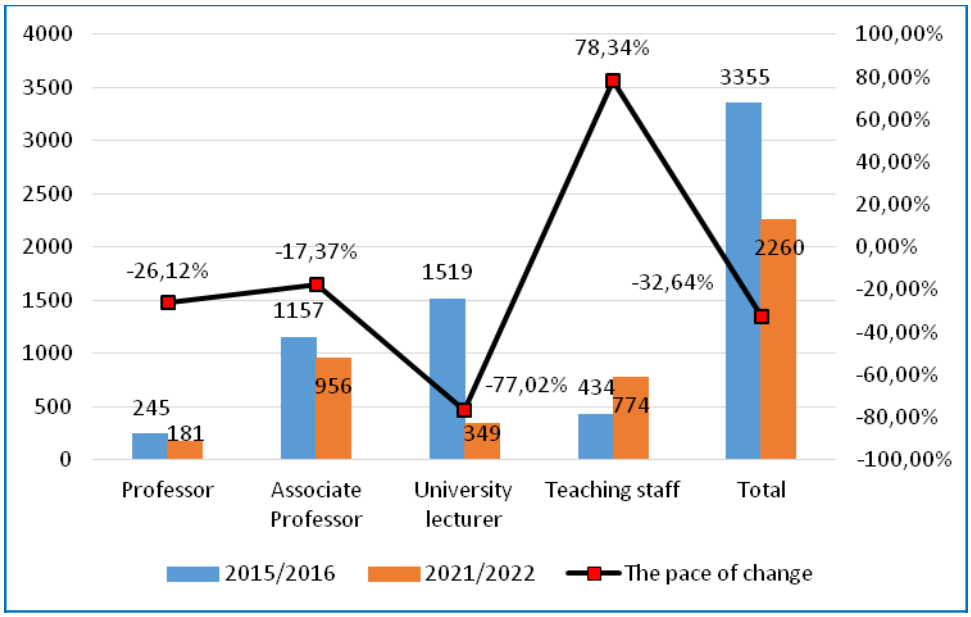

Figure 4. Full-time scientific-didactic staff employed at UTM a.y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

A particular analysis was carried out on the basic full-time scientific-didactic staff, registered for the academic year 2021/2022 compared to the academic year 2015/2016, which shows that the basic full-time staff has decreased by 32.64% (Figure 4) and the number of staff working part-time registered a growth trend of 19.74% (Figure 5).

The increase in the number of staff employed by external accumulation can be explained by:

- Scientific-didactic staff work simultaneously in several educational institutions;
- Attracting in the educational process specialists from the real sector.

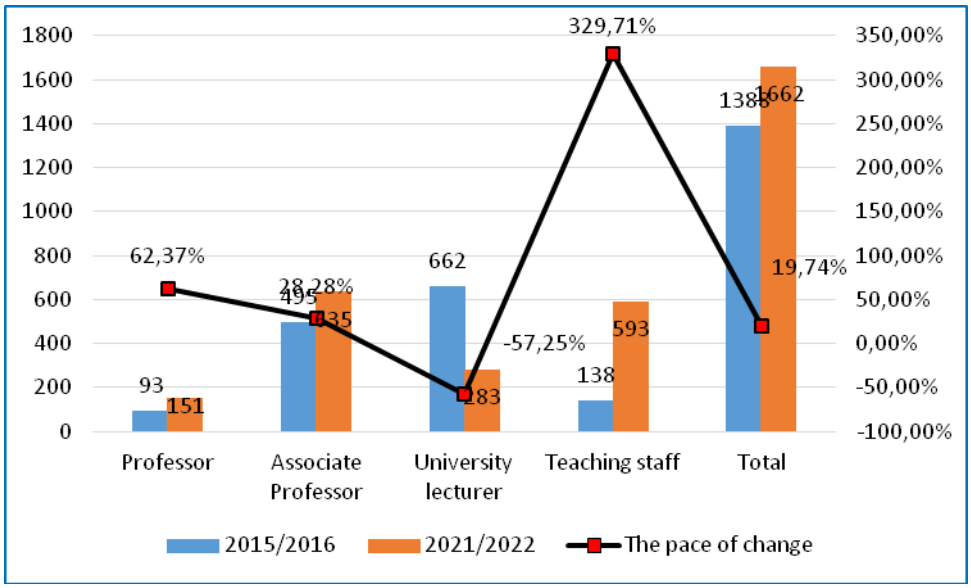

Figure 5. Part-time scientific-didactic staff employed at UTM a.y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

The analysis of the employment flow of the scientific-didactic titular staff classified by scientific grade for the academic year 2020/2021 compared to the reference period, we establish that the pace of change has not undergone great changes. The basic personnel with the scientific degree Doctor habilitate fell by 1.37% (Figure 6), and the basic personnel with the scientific degree Doctor of Sciences increased by 6.09% (Figure 7).

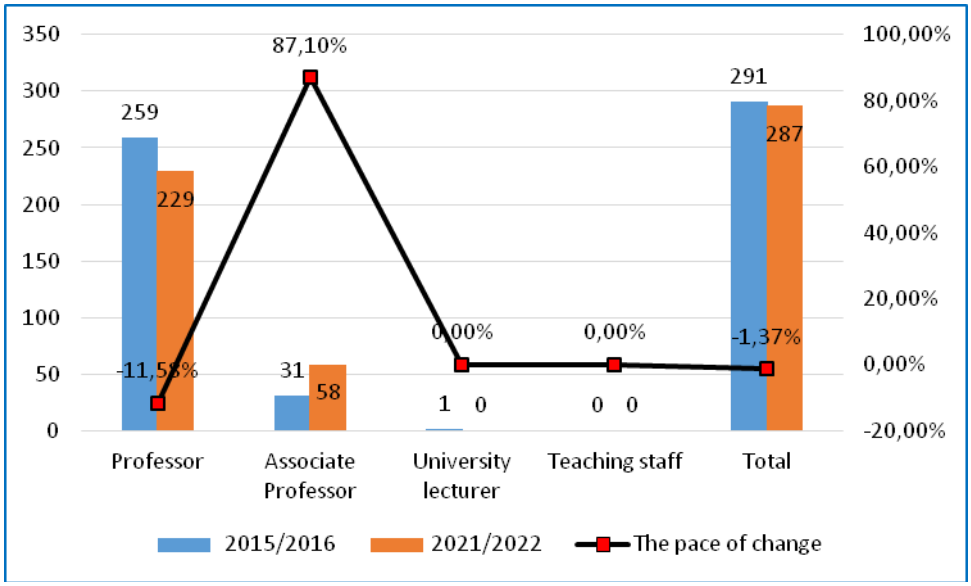

Figure 6. The basic staff with the scientific degree Doctor Habilitate in a.y 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

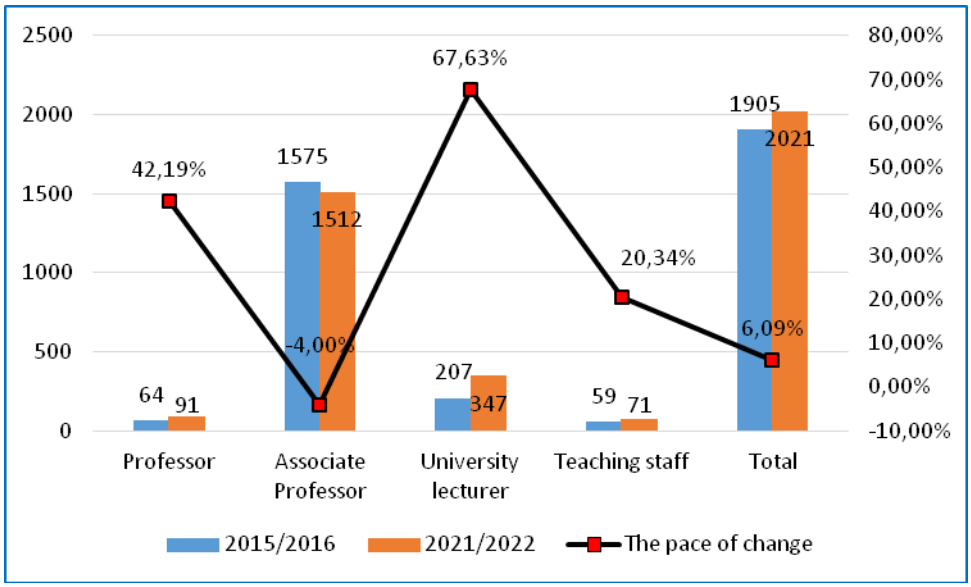

Figure 7. Basic staff with a scientific degree doctor of sciences in a.y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

If we refer to the qualified teaching staff, we can see that in the academic year 2021/2022 the academic staff with a teaching degree – university professor (the data do not include the management staff), increased by 1.39% compared to the reference year and mainly the staff is found in the position of university professor where the rate of change has also increased by 0.35% compared to the reference year (Figure 8).

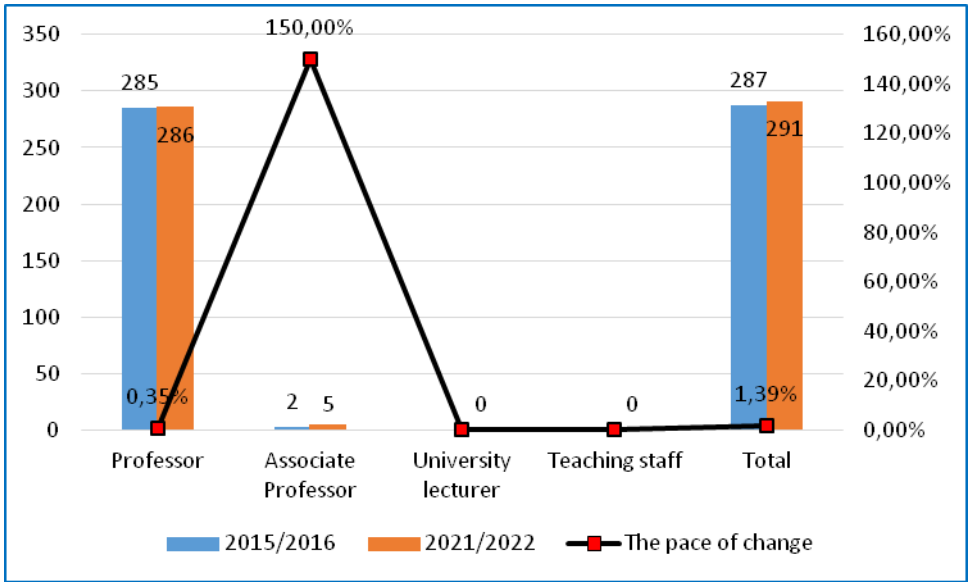

Figure 8. Basic staff with a teaching title university professor a.y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

The analysis of the academic staff with a teaching degree – associate professor (the data do not include the management staff), indicates that the change rate decreased by 13.94% compared to the reference year and mainly the staff is found in the position of associate professor where the change rate also increased by 0.47% compared to the reference year (Figure 9).

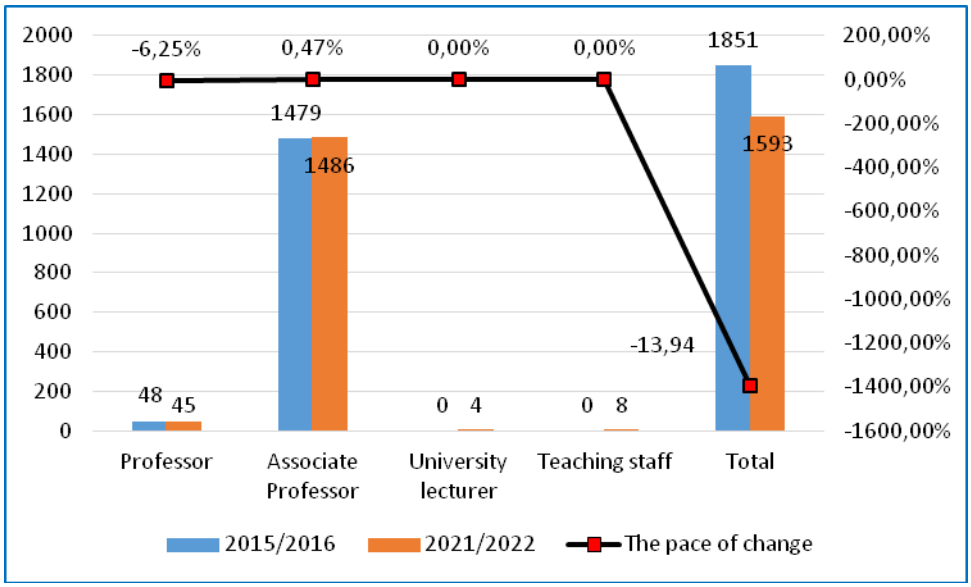

Figure 9. Basic staff with a teaching title associate professor a.y. 2021/2022 compared to a.y. 2015/2016

Source: developed by the authors based on the data provided by the National Bureau of Statistics

The examination of the basic teaching staff with a scientific degree for the academic year 2021/2022 allows us to identify the largest share of the total number of academic staff is held by doctors of sciences with 48.42%, followed by associate professors respectively with 37.06% (Table 3).

An overview of the basic staff separately according to the scientific degree and the teaching title in the university year 2021/2022 compared to the reference period, a negative dynamic was found for all categories, as follows:

- Doctor Habilitate with 25,12%;
- Doctors of Science with 8,04%;
- Associate Professor with 13,94%
- University professor with 23,80%.

Table 3
Basic staff classified by scientific degree and teaching title

Basic staff with scientific degree and teaching title	Academic year		Share, %	
	2015/2016	2021/2022	2015/2016	2021/2022
Doctor Habilitate	410	307	8,30	7,14
Doctor of Science	2263	2081	45,81	48,42
University Professor	416	317	8,42	7,38
Associate Professor	1851	1593	37,47	37,06
TOTAL	4940	4298	100	100

Source: developed by the authors based on the data provided by the National Bureau of Statistics (including the management staff)

Discussion

As a result of the performed research, it was found that the HEI lacks teaching staff with a scientific degree. In the coming years, this problem is to be accentuated and to be a barrier in ensuring the prodigious development of the educational system in the Republic of Moldova.

In order to improve the existing situation, the algorithm reflected in Table 4 is proposed.

Tabel 4
Providing academic staff in HEI: problems and perspectives

Problems	Priority	Perspectives
1. The problem of occupying the position of assistant professor due to the failure to perform the psycho-pedagogical module. 2. The problem of occupying the position of university lecturer because of not holding the scientific title of Doctor in the field. 3. Insufficiency of scientific-didactic staff empowered with the right of doctoral supervisor. 4. The exit from the system of people with pre-retirement and retirement age leads to a not insignificant shortage of teachers.	• Adjusting the credit points obtained at the psycho-pedagogical module with the practical competences cumulated through the teaching experience. • Financial support by granting paid creative leave, decreasing the teaching norm of the teachers involved in the doctoral school. • The decrease of the teaching norm of the authorizing scientific-didactic staff with the right of doctoral supervisor. • Attracting young specialists in the higher education system by providing social, financial, motivational facilities.	• Increase in the number of university assistants hired through competition. • Increasing the number of teachers who will support the doctoral thesis and will be employed through competition as university lecturers / associate professors. • The increase of the interest of the scientific-didactic staff to be empowered with the right of doctoral supervisor will have a positive impact on the increase of the number of doctoral students and on the development of the scientific activity. • Increasing the number of scientific-didactic and scientific staff with young age and increasing the research activity in HEI.

Source: developed by the authors

Conclusion

According to the research carried out, it was found that the causes of the decrease in the number of scientific-teaching staff in the HEI of the Republic of Moldova are determined by a series of problems.

Among them we can mention:

- the number of those willing to practice a teaching career decreases drastically;
- demographic situation and economic instability;
- devaluing the image of a teacher, as a result of demining the importance of education in society;
- unattractive remuneration;
- migration of human resources abroad.

The actions that can be taken to solve the identified problems fall within the:

- promoting the image and status of the teaching staff through mass-media;
- ensuring the flexibility of entry and return to the educational system of the specialists from the business environment by elaborating the normative framework;
- improving the process of career promotion of teachers with a focus on transparency and efficiency;
- ensuring an average salary for the teaching staff not lower than the level of the average salary in the economy and its correlation to be in accordance with the individual professional performance;
- saving and capitalizing on existing resources;
- raising the standard of living in the Republic of Moldova through:
- ensuring a favorable social, political, economic climate.
- the opening up and operation of small and medium-sized enterprises in the production sector.
- compliance with the law.

The actions listed above would allow to solve the problem of the lack of didactic-methodical staff by implementing long-term strategic personnel policies, namely by:

- developing a program for attracting and maintaining high-performing staff in the system, so that the average age of teachers in the education system to decrease;
- improvement of the salary system, which will influence the increase of the share of young staff in the educational system;
- attracting young specialists in didactic, scientific-didactic and scientific activity;
- increasing the standard of living and the quality of life;
- rejuvenation of the average age of the population;
- the increase in the birth rate;
- increasing the number of students in HEI in the Republic of Moldova.

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THE INFLUENCE OF INSTAGRAM SOCIAL MEDIA MARKETING AND TECHNOLOGY READINESS TO INCREASE PURCHASE INTENTION THROUGH SOCIAL MEDIA BRAND ENGAGEMENT MEDIATION ON X INSTANT MORTAR BRAND

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Abstract. *The Covid-19 has disrupted several businesses marketing strategies. This also has an effect on the building materials industry, they have to adapting its marketing to the B2C market via social media. Social Media Marketing can increase a customer's interest in making purchase, according to the findings of prior study and theory; yet, the company's data reveals various outcomes. There was a strong response to the social media marketing campaign, however the number of sales was not related to the number of sales the company made. Consequently, this study will assess the impact of Social Media Marketing on Purchase Intention as mediated by Social Media Brand Engagement, and considering the Technology Readiness. 150 Instagram followers of Mortar Instant X were surveyed using a quantitative way to acquire data for this study. According to the findings, Social Media Marketing has a positive direct and indirect influence (mediated by Social Media Brand Engagement) on Purchase Intention. Meanwhile, Technology Readiness has a positive direct and indirect effect (mediated by Social Media Brand Engagement) on Purchase Intention. It is anticipated that Instant Mortar X and the construction materials industry would use the findings of this study to develop and implement social media marketing strategies.*

Keywords: *Social Media Marketing, Technology Readiness, Purchase Intention, Social Media Brand Engagement, Building Materials Industry*.

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Introduction

The Covid-19 phenomena that occurred in 2020 produced a technical disruption that compelled all businesses to optimize their use of digital media, particularly social media as a marketing channel, to support their operations. Companies have a wonderful possibility to improve brand awareness and sales through social media; consequently, social media has become a popular promotional platform. This transformation also affects how construction materials industry brands communicate and market their products. Considering that the majority of markets in the building

materials business continue to promote their products through traditional means such as building shops, banners, and other offline channels. However, as a result of this disruption and the consideration of the affordability of a larger audience, many companies in the building materials industry have adopted a social media marketing approach. This is also backed by the fact that the number of construction workers (foreman and construction workers) in Indonesia will reach 8.3 million by 2020 (Gunawan, 2020, paragraph 4) Internet connectivity will make Indonesia simpler to access. In addition, the introduction of new markets for building materials provides additional support for this conclusion. This implicitly indicates a change in behaviour, especially during the epidemic, when many were hesitant to leave their homes and purchase building materials directly (Arifin, 2021, para.1). Various brands of construction supplies also recognize and capitalize on this potential to expand their online presence. Beginning with the usage of social media marketing, websites and e- commerce will be utilized to increase sales and retain the brand's viability during the pandemic. Several competitive brands also engage in B2C marketing through social media activities. Nonetheless, after analysing and comparing data between the Mortar Instant X brand and other instant mortar brands, it was discovered that the Mortar Instant X brand had a greater number of Instagram followers and engagement rates than its competitors, but the number of transactions that Brand Instant Mortar X received on online sales, in particular Sales on the marketplace, were lower than other brands. In contrast, a number of studies, including one by Nguyen and Duong (2020, p.24660), demonstrate that the Social Media Marketing approach has a favourable impact on customer involvement and Purchase Intention.

In addition, based on the results of interviews with multiple customers, particularly builders who purchase Instant Mortar Brand products, it is known that these builders do not have social media or email accounts, making it difficult for them to interact with and obtain information about Brand Instant Mortar X on social media. In this context, construction workers are the largest purchasers of Brand Instant Mortar, so it is essential for businesses to target this demographic. Brands must plan measures to raise buying interest by increasing the effectiveness or performance of Social Media Marketing, as well as paying attention to the technological change readiness of consumers and customers (builders and homeowners). This study must be conducted to assist brands in growing their usage of other social media to contact and communicate with customers.

Because there are differences between the results in the field and the research conducted previously by Nguyen and Duong (2020, p.24660) and the importance of the results of this research for input to brands in developing social media marketing strategies in the future, this research was conducted with the objective of determining the effectiveness of Instagram as one of the Social Media Marketing media, the level of customer technology readiness, the level of engagement and also the level of Purchase Intention.

Through this study, new variables that support and influence (the Technology Readiness variable) as well as research objects that explicitly lead to the construction sector are discovered. In addition, this research was undertaken due to the discrepancy between the findings that have a favourable effect on the field's results.

Literature Review

2.1 Theory of Planned Behaviour

The Theory of Planned Behavior (TPB) seeks to predict and comprehend motivating factors on behavior that are not under the individual's control or choice. This idea is predicated on the premise that people are rational entities who make systematic use of all available information (Achmat, 2020). The Theory of Planned Behavior explains that human behavior is guided by three types of considerations: beliefs about the potential consequences of actions (behavioural beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the existence of factors that can facilitate or inhibit behavioural performance (control beliefs). Within each collective, behavioral ideas generate either positive or negative attitudes about behavior. Normative beliefs pertain to societal pressures or subjective norms that are perceived. There is a correlation between control beliefs and perceived or behavioral control self-efficacy. Perceived

behavioral control mitigates the influence of subjective norms on attitudes and intentions to behave. In general, the stronger a person's intention to engage in a particular behavior, the more favorable his or her attitudes, subjective norms, and perception of control. When an individual has sufficient control over his activities, he is expected to carry out his intention. Consequently, intent is thought to be a direct drive to act. As long as perceived behavioural control is accurate, it can serve as a stand-in for actual control and aid in predicting problematic behavior (Ajzen, 2019).

2.2 Marketing Management

Based on the American Marketing Association's definition (Woodall & Hiller, 2022), "Marketing is a 'activity,' a 'set of institutions,' and a 'set of processes,' whereas for the CIM it is a 'management process.” A significant aspect of marketing is forward-looking, customer-centric, and focused on the future. This perspective requires the marketer to view the organization, current resources, activities, and processes from the perspective of the customer. The objective is to create, deliver, and assess market offers (goods, services, or both) in a way that is acceptable to target customers and meets their expectations. Marketing enables firms to accomplish growth through communicating with customers, measuring satisfaction levels, and implementing programs to boost customer contentment. (Czinkoza, Kotabe, et al, 2021, p.6).

2.3 Social Media Marketing

Due to the development of the internet, social networking sites now dominate communication media (Nguyen, et al., 2020, p. 24655); therefore, this is an opportunity for businesses to utilize social media to expand their market geographically (Gao, et al., 2018), support Brand evaluation (Naylor, et al., 2012), and build closer connections with the audience (Rapp, et al., 2013). Numerous social networks, including Facebook, Instagram, YouTube, Linked In, Snapchat, Twitter, Pinterest, WhatsApp, TikTok, and others, are widely utilized throughout the world (We Are Social, 2021).

According to Li et al. (2020), Social Media Marketing Strategy is an integrated pattern of organizational actions based on a thorough evaluation of client motivation. Utilizing social media brands and implementing intentional engagement activities can transform social media engagement (network) and engagement (influence) into strategic instruments for achieving targeted marketing outcomes.

Five concepts comprise Social Media Marketing: entertainment, interaction, trendiness, customisation, and word of mouth. Where, according to Kim and Ko (2012), Social Media Marketing has a significant impact on brand equity, buying intent, and other aspects. In addition, Chen and Lin (2019) have researched the impact of social media marketing on social identity and consumer satisfaction indirectly in different contexts. Moreover, social identity and consumer happiness influence deliberate consistency, involvement, and purchase intention.

2.4 Purchase Intention

According to Wells, Valacich, and Hess (2011) in Nguyen, et al. (2020), purchase intention is the stage at which a consumer has made a decision and is willing to purchase a product or service in terms of marketing, sales, and advertising. According to Dodds et al (1991) as cited in Wibowo et al (2020), purchase intention is the desire of a buyer to purchase a thing. Schiffman and Kanuk (2009) claimed in a book that the desire to buy is the likelihood of a client acquiring a certain product in addition to other, stronger opportunities to make a purchase. In the course of purchasing a product, consumers will seek relevant information based on their beliefs and the surrounding environment. If the necessary information has been provided, the customer will evaluate, consider, and compare before deciding to purchase.

2.5 Technology Readiness

According to Oliveira and Martins (2010) and Porter (2009), which of the following constitutes technological ready or Technology? Readiness includes professional capabilities, users,

e-business, the availability of cutting-edge technology, enterprise technology absorption capabilities, foreign direct investment, internet users, and broadband.

In the meantime, according to Parasuraman (2000) in Panday & Wibowo (2019), technological readiness is a person's propensity to use new technology to achieve goals in their personal and professional lives. This propensity can be measured through four character dimensions: optimism, innovativeness, inconvenience, and insecurity. Optimism is an optimistic outlook and confidence that technology may enhance one's control, flexibility, and productivity. In the meantime, innovation is defined as the tendency to become technological pioneers and leaders. On the other side, discomfort is described as the impression of a loss of control over technology and the inability to cope with technology's presence. Insecurity refers to a feeling of mistrust and scepticism over the functionality of technology. Taylor, Celuch, and Goodwin (2002); Thominathan and Ramayah (2013), cited in Susanto and Pratiwi (2019), p.722.

2.6 Social Media Brand Engagement

Hollebeek (2014) defined customer Brand engagement as cognitively, emotionally, and positively valanced consumer brand-related activities that occur during or are associated with certain consumer/brand interactions. In the meantime, according to Gomes et al. (2019), Social Media Brand Engagement is a proactive and engaged engagement between the consumer and social media platforms that belong to the Brand, along with a passion for and absorption in social media platforms Brand.

According to So, et al. (2014), a multidimensional approach to brand involvement comprises five cognitive, affective, and behavioural activities: identification (level of consumer ownership of the brand), enthusiasm (consumer excitement and interest in the brand), attention (level of consumer focus and relationship with the brand), absorption (consumer concentration, immersion, and preoccupation with the brand), and interaction (consumer concentration, immersion, and preoccupation with the brand) (consumer participation with the brand).

H1: Social Media Marketing has a positive influence on Social Media Brand Engagement

Experts in the field acknowledge that the advantages of online social networks are not limited to attracting clients, but also improve the current product and branding of enterprises (Forbes, 2015). In their research, M. Gomez et al. (2019) found that social media facilitates Brand Engagement, defined as the level of contact and relationship between customers and brands. Harris and Rae (2009), cited in Nguyen et al. (2020), argue that in the future, Social Media Marketing will play a significant role in increasing customer interaction and marketing. M. Gomez, et al. (2019) have done research and produced results demonstrating that Social Media Marketing (which is described by Social Media Brand Communication and Social Media Brand Involvement) has a favorable impact on Social Media Brand Engagement.

H2: Social Media Marketing has a positive influence on Purchase Intention

In prior research conducted by Pjero and Kercini (2015) on social networking sites and their impact on customer behaviour, the findings indicate that internet-based information about services and products has a beneficial effect on consumer purchase intentions. In addition, Nguyen et al. (2020) have conducted research on the effects of Social Media Marketing on Purchase Intention in Vietnamese society, demonstrating a favourable effect.

H3: Technology Readiness has a positive influence on Social Media Brand Engagement

The urge for rapid social engagement through the portability of digital gadgets is now ingrained in the community, particularly among the so-called digital natives generation. A person who is comfortable with digital technology (has a high level of technology readiness) will find it challenging to communicate with individuals (including brands) who are unfamiliar with digital

technology media (Panjaitan, et al, 2021). Therefore, the greater a customer's readiness to utilize technology, the more interactions they will have.

H4: Technology Readiness has a positive influence on Purchase Intention

According to research conducted by Goutam et al. (2022), Technology Readiness has a significant impact on Purchase Intention. This is achievable because clients who feel confident using modern technologies to buy online are more likely to make purchases. If online buyers are confident in their ability to use online technology, they exhibit positive purchase intentions and develop brand loyalty.

H5: Social Media Brand Engagement has a positive influence on Purchase Intention

According to Barhemmati and Ahmad (2015), the relationship between the client and the company is key to the growth of the company's potential in attaining marketing objectives. If consumers have a great shopping experience, their likelihood of intending to acquire products and services will increase (Nguyen et al, 2020). Hollebeek (2011) also stated in his research that the concept of brand engagement in this study refers to "consumers," particularly at the level of cognitive, emotional, and behavioural activity in brand interactions, and is regarded as crucial for influencing consumer behaviour (Bowden, 2009), such as self-Brand connection, Purchase Intention, and Brand loyalty (Harrigan, et al., 2017; Lecki, et al., 2016).

Methods

This study employs a quantitative research approach with an emphasis on the relationship between Social Media Marketing (X1), Technology Readiness (X2), Social Media Brand Engagement (M), and Purchase Intention (Y). A total of 130 Instagram followers of Brand Mortar Instant X constituted the research population. This study employs a probability sample technique with the criterion that participants must follow Instagram Brand Mortar Instant X and have a role in deciding which building materials to purchase. Using Instagram direct messages, questionnaires were distributed via the Google Form to collect data (Figure 1).

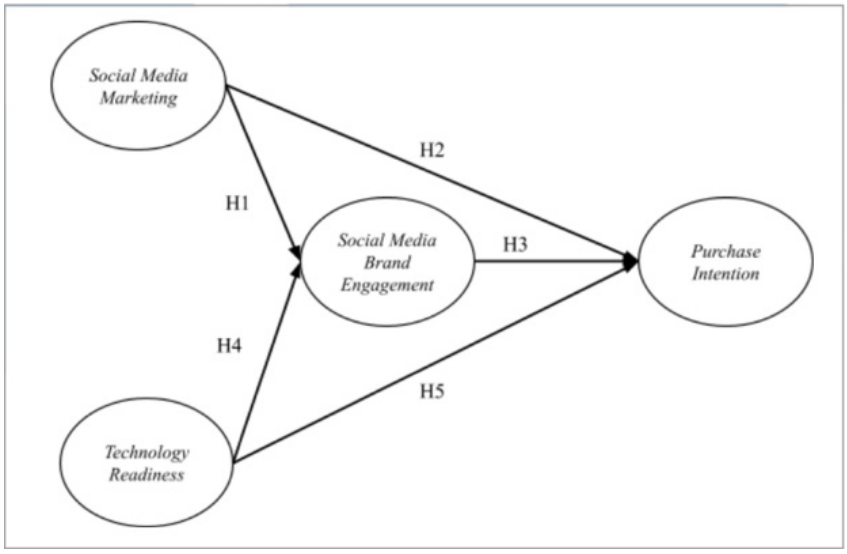

Figure 1. Research Model

Source: Modification from Borrero, et al (2014), M. Gomez, et al (2019), Sanjaya (2020)

Results

4.1. Outer Model Test

Convergent Validity, Discriminant Validity, Composite Reliability, Cronbach's Alpha, and Average Variance Extracted are measured for the Outer Model test (AVE). This test is meant to demonstrate the relationship between each indicator variable and each latent variable (Hair, et al., 2013).

Table 1
Outer Model Test Results

Variable	Indicator	Loading Factor	AVE	Composite Reliability	Cronbach's Alpha	Desc
Social Media Marketing	SMM.1	0,844	0,722	0,928	0,904	RELIABLE & VALID
	SMM.2	0,831				
	SMM.3	0,869				
	SMM.4	0,833				
	SMM.5	0,871				
Technology Readiness	TR.1	0,835	0,680	0,950	0,941	RELIABLE & VALID
	TR.2	0,825				
	TR.3	0,750				
	TR.4	0,833				
	TR.5	0,803				
	TR.6	0,844				
	TR.7	0,858				
	TR.8	0,810				
	TR.9	0,857				
Social Media Brand Engagement	SMBE.1	0,792	0,745	0,959	0,951	RELIABLE & VALID
	SMBE.2	0,860				
	SMBE.3	0,916				
	SMBE.4	0,911				
	SMBE.5	0,894				
	SMBE.6	0,897				
	SMBE.7	0,856				
	SMBE.8	0,764				
Purchase Intention	PI.1	0,912	0,772	0,931	0,901	RELIABLE & VALID
	PI.2	0,914				
	PI.3	0,785				
	PI.4	0,897				

Source: Processed by Researchers, 2022

According to Table 1, all indicators for the Social Media Marketing, Social Media Brand Engagement, Technology Readiness, and Purchase Intention variables have a loading factor larger than 0.70 and an AVE greater than 0.5. (Hair, et al., 2013). This demonstrates that the indicator is a valid measure of the concept. Moreover, the Composite Reliability and Cronbach's Alpha values of the four variables were greater than 0.70, hence it can be inferred that all variables in this study were trustworthy (Fidelity, 2020).

4.2. Inner Model Test

Following the testing of the Outer Model, the Inner Model is tested. The test is evaluated based on the R-square value for the dependent construct, the t-statistical value of the test for the path coefficient, and the VIF value for testing multicollinearity (Hussein, 2015; Hair, et al., 2013).

Table 2
R-Square Value

	R-Square
Purchase Intention	0,531
Social Media Brand Engagement	0,451

Source: Processed by Researchers, 2022

The results of the R2 variable Purchase Intention are 0.531, while the R2 variable Social Media Brand Engagement is 0.451. Therefore, it can be concluded that Social Media Marketing and Technology Readiness have a weak influence of 45.1%, whereas the influence of Social Media Marketing, Technology Readiness, and Social Media Brand Engagement is moderate at 53.1%

Table 3
VIF Value

Variable	Purchase Intention	Social Media Brand Engagement
Social Media Brand Engagement	1,820	-
Social Media Marketing	1,830	1,383
Technology Readiness	1,508	1,383

Source: Processed by Researchers, 2022

The purpose of the multicollinearity test is to determine whether or not the relationship between indicators is multicollinear. If the VIF value is greater than 5, the indicator exhibits multicollinearity (Hussein, 2015). According to the above table, there is no multicollinearity since all VIF values are less than 5.

Table 4
F-Square Value

	Purchase Intention	Social Media Brand Engagement
Purchase Intention	-	-
Social Media Brand Engagement	0,207	-
Social Media Marketing	0,077	0,323
Technology Readiness	0,042	0,090

Source: Processed by Researchers, 2022

Because the F-square value is between 0,02 and 0,15, the effect of Social Media Marketing on Purchase Intention, Technology Readiness on Purchase Intention, and Technology Readiness on Social Media Brand Engagement is minimal. On the other side, the influence of Social Media Brand Engagement on Purchase Intention is moderate, as its F-square value falls between 0,30 and 0,15. With an F-square value of 0,30, the influence of Social Media Marketing on Social Media Brand Engagement may be described as substantial (Hair, et al., 2013).

Table 5
Direct Patch Coefficients Test Results

	T-Value (>1,645)	P-Value (<0,05)	Conclusion (Accepted/Rejected)
SMBE ⇨ PI	4,255	0,000	Accepted
SMM ⇨ PI	2,850	0,002	Accepted
SMM ⇨ SMBE	5,846	0,000	Accepted
TR ⇨ PI	1,916	0,028	Accepted
TR ⇨ SMBE	2,725	0,003	Accepted

Source: Processed by Researchers, 2022

Table 6
Indirect Patch Coefficients Test Results

	T-Value (>1,645)	P-Value (<0,05)	Conclusion (Accepted/Rejected)
SMM ⇨ SMBE ⇨ PI	3,456	0,000	Accepted
TR ⇨ SMBE ⇨ PI	2,450	0,007	Accepted

Source: Processed by Researchers, 2022

According to Table 5 and 6, the Social Media Marketing variable and the Purchase Intention variable have a complementary type of partial mediation because the influence of Social Media

Marketing on Purchase Intention is significant and the influence of Social Media Marketing on Purchase Intention via mediation Social Media Brand Engagement is also positive and significant.

Meanwhile, the Technology Readiness variable to the Purchase Intention variable also has a complementary type of partial mediation because the relationship between Technology Readiness and Purchase Intention is positive and significant, and Technology Readiness can also positively and significantly influence the Purchase Intention variable via the Social Media Brand Engagement variable (Pungkas, 2022).

Conclusion

After testing and analysing each variable relevant to the hypothesis, it is determined that all hypotheses are valid. Thus, the following can be concluded:

1. Positively and significantly, Social Media Marketing influences Social Media Brand Engagement.
2. Social Media Marketing has a favourable and substantial effect on Purchase Intention.
3. Social Media Brand Engagement has a favourable and significant effect on Purchase Intention.
4. Positively and significantly, Technology Readiness impacts Social Media Brand Engagement.
5. Technology Readiness effects Purchase Intention in a major and beneficial way.

Despite the fact that the number of respondents in this study is less than 200, the research object concentrates on a single company in the construction materials industry and explicitly examines marketing techniques in the B2C market without taking into account the respondents' occupations. Based on these constraints, the researcher makes the following recommendations for future research:

1. Conduct research with a bigger number of respondents and a greater focus on the target market, such as research aimed at homeowners, construction workers, interior designers, and others, in order to generate data that can represent a brand in the building materials business.
2. Conduct research from a variety of industry viewpoints in order to generate fresh perspectives on current factors from other sectors.
3. This study focuses on a particular brand of instant mortar; however, future research can substitute the product with another Brand so that the results are representative of the construction materials market.
4. So that more research can evaluate the B2B-focused marketing approach in the building materials business.
5. Test and evaluate the impact of Purchase Intention using alternative test variables.

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JEL Classification: M31, M310, M50

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MARKETING DIRECTION OF MARKETPLACE SALES TO THE CONSUMERS OF THE DIGITAL AGE

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Abstract. *Contemporary market changes, especially after the Covid-19 pandemic, are directing sales on the markets to consumers of the digital age. The problem that the research wants to achieve is consumer preferences and needs analysis in order to understand sellers' actions in products selling. Numerous researches results indicate that there is a potential of this market and that it has specialties in comparison to traditional consumers. The goal of this work paper is to give encouragement to market sellers for additional investments in marketing in order to achieve increased business results. Theoretical research results are based on professional literature usage, the author's experience, statistics data and tables, while the empirical research was carried out using a survey questionnaire. The empirical research results show that there is both sellers' and consumers' interest in purchasing and implementing useful changes in marketing communications. From the research conducted, can be concluded and recommended that certain marketing orientation can influence the increase in the market products sale that will contribute to the specific customers' interests satisfaction and consumption increase.*

Keywords: *marketing direction, markets, sellers, consumers, digital age.*

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Introduction

Marketing direction towards consumers of the digital age creates a new trade dimension and facilitates the communication of specific consumer preferences for sellers. For marketplaces as small individual business entities, these technologies appliance is essential for recognizing, learning and solving the problems of lease users and consumer behaviour algorithms (Prdić et al., 2022). It can be said that agricultural products buyers are homogeneous in terms of desires and preferences, so the marketplace activity in trade should be adjusted to that. Especially, it is necessary to emphasize that these products are essential for human health. During the last year many things have changed, so the first post-pandemic survey was expanded with additional questions regarding sources of information, new social networks and advertising formats popularity (Kostić, 2022). Hence, the fundamental task of marketing direction is the market differentiation, the promotion and sale of marketplace products through social networks, e-markets and other means of distribution to digital age consumers. The core of a good value delivery system is a set of key business processes which help deliver distinct value to the customer (Mittal et al., 2005). Up to date technology enables markets and sellers to monitor and recognize the wishes and motives of purchase, which is enabled

by the market group and the level of value in the consumption of fresh products. Dynamic life in urban areas presents an additional challenge of survival (Bott et al., 2019). Marketplaces contribute to many social benefits, increased income, social communication and interaction, social wealth development, and also a higher degree of connection between consumers and the local community (Bonanno et al., 2017). Marketplaces emerged along with the emergence of commodity exchange, about five thousand years ago (Petrović et al., 2021). If we take the historical and actual context of the market role in fresh products distribution, its social importance, and agricultural products as part of the market significant for people's living and health, it is necessary to adjust the market assortment and marketing activities to the market trends, taking into consideration tradition and modern, urban generation of consumers.

The aim of the work is investigation of the connection and reliability of the marketing direction of the sale of agricultural products from the marketplace through online purchase to the satisfaction of modern, digital age consumers. The results of this research can serve marketplaces as business enterprises for identifying factors that influence business relationships building between markets, sellers and consumers. After introduction, follows a review of the literature, then the formation of hypotheses based on the research materials and methodology, and finally, research results and conclusions in the form of recommendations. The author's practical and scientific experience contributes to the making recommendations for business practice appliance.

Literature Review

The budgeting process is complex, consistent of several serial steps, which implementation needs some time (Mihajlović et al. 2022). The primary task of marketers is to create budget for directing marketing communications to consumers who are historically tied to the digital age. Companies are taking advantage of social networking platforms in order to expand their geographic reach of customer (Gao et al., 2018). In the case of marketplaces, social network platforms provide greater representation on the market and reorientation of the market business model. Social networks have emerged as a powerful and effective tool for business communication maintenance (Hussian et al., 2019). Digitization of services was analysed from everyday life point of view and users as a tool that can (and should) be used by the community (human-cantered digitalization) (Toivonen et al., 2019). Namely, the market success, in addition to the modern communication technologies usage, implies other social life issues, and marketplaces are good places for that. Urban and rural areas are significantly different in the daily use of the Internet (Eurostat, 2020). Otherwise, in many development technology clusters, corporate activity dominates more than university activity (Ahmetagić et al., 2022). The simple organization and organizational structure direct the marketplaces to rural areas of production, but also focus on agricultural production clusters. Based on the positive correlation between domestic producers, safe shopping for consumers and the positive correlation between collecting taxes for the state, and a clear position in the public eye, the future direction of marketplaces is defined (Prdić, 2022) There are more and more portals and pages offering new ways of buying and selling products and services (Vladisavljević, 2022). Money transactions and sales through social networks must not be at the expense of state taxes collecting. Improving one's own market performance implies monitoring and learning from competitors, the ultimate effect of which is to see one's own marketing position, adjust and adapt, and achieve a strategic position (Prdić et al., 2022). Own business performance should be used as an effective tool for identifying competitors' performance. Modern business analysis is a special business activity (Cavlin., 2022). Business analysis in the digital age implies reaching and analysing the best business processes. The world economy is changing fast, the global growth of the trade exchange of goods is constantly increasing from year to year, both absolutely and relatively (Gazdić et al., 2022). Information technologies and digital transformation together make perfect tools in production and services for companies that are visible, networked and beneficial to their users.

Methods

The central problem that we analyse in the work paper is the formation of a marketing directions integrated model that would lead to online sales of market products increase. There was conducted a thorough analysis of online shopping, especially after the Kovid-19 pandemic, as well as the importance of modern consumers of the digital age and current positions in the sale of marketplace fresh products. The main goal is observation of current trade factors and marketing activities planning. Focusing on consumers of the digital age means to emphasize the usage of fresh products based on good communications. The research was conducted using a personal interview via a survey questionnaire and included 180 respondents at the Futoška market in Novi Sad, as part of the JKP Tržnica, during the period of June 15 to 30, 2022. Of those interviewed 150 are consumers and 30 are sellers of vegetables. For vegetable sellers, the condition was that they sell products 5 times a week. The research was performed in the green part of the market. When it comes to consumers who were surveyed on a sample of 150, only those who come to the market 3-4 times a week were interviewed. The theoretical part of the research is based on the application of professional and scientific literature in the field of marketing, business and markets. The results were processed using statistical data processing methods and presented by tables and graphs. Marketing research is a function that connects consumers, customers and the general public with the marketer using information - and that information serves for recognition and defining marketing opportunities and problems, to design, refine and evaluate marketing actions, to monitor marketing performance and to improve the understanding of marketing as a process (Kotler et al., 2017).

The intention is to use the selected methods for achieving the goal of the research by establishing an effective model of marketing directions, and also to verify the following hypotheses through empirical research.

H1: Sellers in the market insufficiently use online product sales as a concept of effective sales.

H2: Consumers in the market have a positive attitude about the potential change of attitudes about shopping - Among consumers exist average desire for online shopping and changes in shopping.

Results and Discussion

Analysis of research of marketplace sellers' attitudes about shopping online

During the interview itself and conversations with vegetable sellers, the opinion that prevailed is that condition for being interviewed is the experience of products sale of 5 years minimum. This condition is set for the relevance of the research. These sellers also have a broader perception of the importance and social role of markets in selling fresh and healthy agricultural products. In response to the question from hypothesis ***H1***, the surveyed sellers had the opportunity to give an answer on a scale from 1 to 5, where 1 expressed a negative opinion, and 5 anextremely positive one. According to the data in Table 1, the average score of insufficient application of online communication in sales is 2.5 in the area of the analysed marketplace.

Table 1
Data on the average rating of online product sales

	N	Mean	Stan. deviation	Std. Error Mean
Underselling	30	2,5	,660	,0664

Source: Author's research

Table 2
One sample test, average grade of online sales application (close value=3). 95% Confidence interval of the Difference

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Underselling	-6,185	28	,000	-,378	-,5112	-,2256

Source: Author's research

In accordance to empirical test data obtained, with the significance of a*=0.000=0%, a*<5%, which shows that the average value, the evaluation of insufficient application of online communication in sales differs from the tested value, so it can be concluded that it cannot be accepted hypothesis that the average rating of the application of online communication in the analysed market is 3, since in the sample it is equal to 2.5, which means that it is less than 3. So, hypothesis ***H1*** is not accepted.

Analysis of consumer attitudes about online shopping research

The research of consumer attitudes in the analysed market includes consumers' perceptions and attitudes about the purchase itself and purchasing decisions (Table 3 and 4). Besides, the research embraced the basic factors in the conceptual model of purchase that have a direct impact on the purchase, such as reliability, safety, quality and price of products.

Table 3
Estimated evaluation of consumer changes in shopping

	N	Mean	Std. Deviation	Std. Error Mean
Change of user	180	3,989	,63780	,06410

Source: Author's research

Table 4
One sample test, evaluation of user behaviour change (close value=4). 95% Confidence Interval of the Difference

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Willingness to buy online	3,031	179	,00	,49545	,3667	,61222

Source: Author's research

According to the obtained data of the empirical test a*=0.989==98.9.3, % a*>5, which means that the average rating of acceptance of online shopping (i.e. the rating of changing the user's behaviour) in shopping with consumers does not differ from the tested value. Thus it can be concluded that hypothesis that the average desire for change for shopping behaviour in the entire set is 4 can be accepted. From the presented above, it can be concluded that the hypothesis ***H2*** is accepted. So, consumers on the market have a positive attitude about the potential change in the way of shopping, i.e. adding to the existing traditional shopping and sellers' offer and their own shopping behaviour. In the future, it is necessary to maintain a continuous research of consumer attitudes. Knowledge based on scientific results, can help the markets to more easily recognize the factors and their influence on the leasing of space to sellers, but also the offer of sellers of products for online shopping and adjust their offer accordingly. Organizations are becoming more capable of collecting and exploiting personalized user data (Payne et al., 2017). The research confirmed the attitudes of consumers that they are ready for online shopping as a complement to traditional shopping, which implies that creation of a customer database is the foundation for future marketing directions. Using this database, a customer profile is created and it may help in making relevant business decisions (Business Dictionary, 2018). The existence of a positive connection between the database of markets and sellers can lead to the organization of special e-marketplaces and largely increase business activity on the market as well as consumer satisfaction with online shopping.

By using the survey questionnaire of the analysis of the attitudes of consumers about the online purchase of agricultural products, the respondents answered the previously asked questions about the importance for the purchase, and the following answers were given. What are the most important factors for you in online shopping?

- Reliability of online shopping 38%
- Safety of online shopping 17%
- Quality of products 25%
- Price of products 20%.

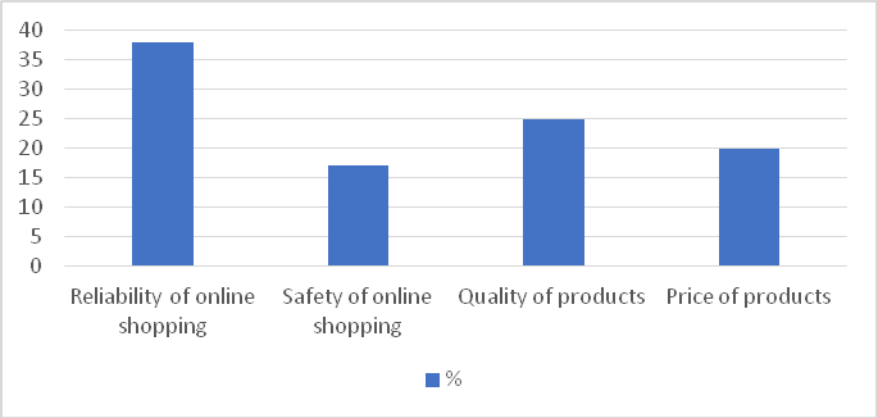

Figure 1. Factors affecting online shopping by consumers
Source: Author's research

In the research, there were checked the sellers' views on the desire for online sales and consumers' views on the online purchase of agricultural products from green markets. The results show the connection of sellers' interest in sales, but they use it insufficiently. Consumer attitudes about purchase of products online are positive and can be useful to sellers and market places for organizing e-markets. The results of the research on consumer attitudes indicate the existence of a significant positive correlation between reliability and consumer satisfaction of 38%, which is in line with numerous studies after the Covid-19 pandemic. Also, there a significant correlation related to the safety of online shopping 17%, product quality 25% and product price 20%, which indicates that consumers do not make distinction between the products they buy in the market places and online, and expect the same quality and price.

Recommendation

Digital technologies find their implementations in all branches of the economy. Besides the company's ability, the use of these technologies also depends on the ability and understanding of their benefits. Nowadays communications and the application of technology give a chance for sellers to augment their sales and preserve competitiveness on the market. The application of technology provides easier access to products and services, better functionality and new revenues (Gomber et al., 2018). Solving the tasks of determining the statistical characteristics of the output information of complex systems can be achieved by modelling, using the methods of statistical testing (Savić et al., 2022)

The representativeness of the statistical model ought to be measured by the coefficient of determination of dependent variables. The level of online shopping depends on the influence of independent variables such as reliability, security, quality and price. Positive correlation existing between these factors and online shopping, provides a motive for sellers for creating effective marketing and sales strategies in the online environment. Besides the field research, the research can be extended to online one, through social networks, and to include both social and demographic characteristics of consumers, that are pivotal.

Conclusion

Contemporary market environment in the so-called digital age is getting more and more complex and dynamic. Business systems are directed towards users in a joint effort of creating value. The work paper has identified changes in relations between sellers and consumers and their mutual relations when it comes to online sales and purchases of agricultural products from green markets. Digital changes have altered sellers - consumers' communication, particularly after the Kovid-19 pandemic, and the role of customers is a basic factor in trade and value creation. Marketing orientation is a new approach to sales, databases, orientation towards digital sales and marketing, and all that are parts of the process and contemporary trends.

Marketplaces and marketplace sellers' business strategy requires adjustability to the digital era market. The fundamental business principle of marketplace sellers includes adapting to

transformations in digital business, following trends in online sales and changing personal business strategies in that course. The actual sellers' marketing strategies have to be changed and specially adjusted to the group of consumers of the digital age with the assistance of strategy of marketing targeting.

Based on the empirical data of the hypothesis ***H1*** testing, it is clear that the average rating of the insufficient application of online communication by sellers in sales differs from the tested one. In the sample is 2.5 and that is, therefore, lower than the tested 3, so the hypothesis that market sellers use online sales as a concept of effective sales of products to an insufficient degree, it is not accepted.

According to the empirical test of hypothesis ***H2*** data, the average rating of acceptance of online shopping among consumers does not distinguish from the tested one, so the hypothesis that the average desire for changes in shopping behaviour in the entire group is 4, and hence is accepted. Therefore, the hypothesis that consumers on the market have a positive attitude about a potential change in shopping standpoints - the average desire for online shopping and changes in shopping exists among consumers, since they have a positive attitude about changes in shopping. So, the hypothesis is accepted Consumers on the market have a positive attitude about a potential change in the way of shopping, i.e. renewing existing traditional shopping and sellers' offer and their own shopping behaviour.

In addition to new knowledge about customer behaviour when shopping online through attitudes about reliability, safety, product quality, and price, the results of this research can be useful to markets and business organizations both through communication and influence on sellers and on consumer satisfaction in online shopping. In addition to the theoretical and empirical contributions of the research, there are certain limitations that primarily relate to the size and distribution of the sample. Future research should be directed in the direction where the demographic structure of the respondents can be included in the sample size.

Future Research Lines

Naturally, we understand some limitations in the study, as it is a specific case and in which there was a strong capacity and opportunity for improvement. Thus, we defined as future lines of research, two fundamental and converging options, which would be the possibility to compare the results over time with other industrial organizations and apply the study methodologies to companies in non-industrial sectors, such as logistics and services (Romana, 2016).

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CORPORATE STRATEGY FOR MANAGING EVOLUTIONARY PROCESSES OF THE ENTERPRISE DEVELOPMENT

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Abstract. *The method for analyzing phase portraits of bifurcation diagrams of enterprise life cycle scenario models using IT pattern recognition has been proposed, which allowed to numerically determine the geometric parameters of the spatial forms that form the surfaces of phase portraits, and their size, corresponding to the loci of stability and interaction of four populations in a network of trophic relations. To analyze the results of the recognition of phase portraits of ELC bifurcation diagrams, singular points of perturbation, attenuation, cycles, equilibrium, their stability, the input examples of the state of bifurcation have been classified into five separate clusters in accordance with the ELC development scenarios. An IT support algorithm for the corporate strategy for managing the evolutionary processes of enterprise development has been developed. It covers the following stages: analysis and evaluation of the internal and external environment of the enterprise population and trophic relations; identification of possible motives for changing trophic relations and causes of synergy; studies of the nonlinear dynamics of ELC model scenarios; analysis of many strategic alternatives; selection of a strategy and preparation of a strategic plan; monitoring the results of achieving a synergistic effect, which will allow choosing strategies depending on the ELC stages and ensuring the competitiveness of the enterprise.*

Keywords: *Mergers & Acquisitions, evolutionary model, enterprise life cycle, strategic management, bifurcation point.*

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Introduction

Today, evolutionary economic theory is actively developing in economic science. This is due to the fact that orthodox methodological approaches can no longer adequately and fully explain and predict the phenomena of social being. This process in time correlates with the intensification of research in the field of information technology (IT), and in the field of economic policy, these trends are associated with the need to modernize the socio-economic system in an unstable economic environment.

Evolutionary economic theory has made it possible to link processes in the economy with biophysics. This, in particular, is the classical model of mathematical biophysics, which describes the dynamics of the number of populations interacting on the basis of the "predator-prey" principle; the trophic chain of inter-population relations for obtaining resources (raw materials, energy, finances, labor, information, etc.), which is realized through M&A of some enterprises by others. Populations are sets of representatives of the same type of enterprises that belong to the same level of the trophic network and are characterized by limited available resources; producer population that provides raw materials; consumer population (potential competitor), which is a "predator" in relation to the "producer" and "victim" to the "predator"; "predator" population, which is an economic entity and is considered to be the top trophic level of the network.

Despite a significant contribution to the development of this problem, transformations in the economy necessitate an ongoing search for new IT approaches in research and modeling of economic processes, forecasting the synergetic effect of mergers and acquisitions (M&A), and the creation of new IT economical and mathematical modeling of the dynamics of evolutionary processes of trophic relations of enterprise populations. The outlined questions determine the relevance of the topic of the work, its theoretical and practical significance.

Literature Review

Evolutionary economics is a fairly new and promising area in economic science. In general, it is opposed to the main trends of economic theory, in particular neoclassical, that is, orthodox theory (Amankwah-Amoah, J., Boso, N., & Antwi-Agyei, I. (2018)). This confrontation is primarily in the fact that the evolutionary economy refuses an equilibrium approach, it is process-oriented.

The evolution of the economic system, is a dynamic process that occurs evolutionarily under the influence of innovations in science and technology, market needs, changes in organization and legal relations (Chen, S. H. (2017)).

Evolutionary economics, especially econophysics, is a relatively new and advanced area of economic science, capable of formalizing and predicting non-equilibrium non-linear economic processes, price dynamics, stochastic processes in financial markets, life cycles of economic structures (Feng, T., Tai, S., Sun, C., & Man, Q. (2017)). Evolutionary economics and econophysics exist and are developing in the space of economic knowledge, in which the concept of static rather than dynamic economic equilibrium still prevails. The part of the economic and mathematical models has become field-specific and isolated from other sciences, inevitably leads to a crisis of economic developments.

Evolutionary economic theory includes such economic studies where the system-wide principles of diversity, which is changing, agent heterogeneity, disequilibrium, development uncertainty, instability, and the like play a significant role; orthodoxy includes a study that focuses on opposite principles of solidified diversity, agent homogeneity, equilibrium, determinism, stability, etc. (Hamilton, D. (2017)).

Therefore, the result of the interaction of opposites should be their specific symbiosis. This is completely impossible since evolutionary theory and orthodox teaching are opposite in methodology. The first comes from the diversity, which all the time is in motion and develops, nonequilibrium, instability, and the second - from an unchanged, solidified diversity, equilibrium, stability and the like. It is impossible to mechanically combine such opposite principles and approaches because it contradicts the elementary laws of dialectics.

An even less convincing argument in favor of the parallel existence of these theories is that it seems that evolutionary principles are more clearly manifested in that part of the economy that produces material resources, and orthodox ones - in the economy that produces goods and services (Hodgson, G. M. (2018)). It is difficult to realize the "sector" division of the theory, and even more so the conclusion that the resource economy is better studied from the standpoint of dynamic and evolutionary theory, and the production of goods and services from the standpoint of statics and orthodoxy. It is easy to see that both sectors are developing and changing, therefore, these processes are most reflected in the dynamic, evolutionary economic theory.

And finally, the argument in favor of the various areas of competence of these two theories is that evolutionary theory is limited to the study of mesolevel and does not provide a complete analysis of evolutionary processes at the macrolevel. Indeed, starting with Keynesianism, macroeconomic issues have been intensively developed in economic theory (Huang, C., Cao, J., Xiao, M., Alsaedi, A., & Alsaadi, F. E. (2017)). Although there are actually problems here, it's quite clear that in the interests of the development of evolutionary economic theory that means a big step forward in understanding the laws of economics, it's not only possible but also necessary to use the achievements of neoclassics, adapting them to the system and principles of evolutionary theory.

Among the modern areas of research within the framework of the evolutionary economy, the authors single out studies of the enterprise population — an analysis of organizations as complex structures, which primarily include firms and markets, etc. (Lu, R., Wang, X., Yu, H., & Li, D. (2018)).

Like individuals, organizations have limited rationality and produce routines that enable them to operate successfully in changing environmental conditions (Metcalfe, S. (Ed.). (2018)).

Like standards, these routines have the function of saving knowledge and reducing transaction costs (Santangelo, G. D., & Meyer, K. E. (2017)). The latter is achieved due to the fact that the behavior of participants in the organization, adhering to certain rules, becomes more predictable. In other words, routines facilitate the interaction of individuals within organizations and embody accumulated knowledge.

The conducted analysis of theoretical studies of existing approaches to the formation of an evolutionary paradigm in the economy creates a significant basis for the development of evolutionary modeling, as well as the introduction of IT support for the management strategy of enterprise development processes.

The IT modeling of the dynamics of the evolutionary processes of trophic relations of enterprise populations includes:

genetic algorithm (GA) (Saviotti, P. P., & Metcalfe, J. S. (2018)), designed to optimize the functions of discrete variables, which focuses on genome recombination;

evolutionary programming (EP) (Smith, K. (2018)), focused on the optimization of continuous functions without the use of recombination; EP in the form of evolution of logical automata solves the problems of forecasting, diagnostics, recognition, and classification of images;

evolutionary strategy (ES) (Stefan, L., Thom, W., Dominik, L., Dieter, K., & Bernd, K. (2018)), focused on the optimization of continuous functions using recombinations;

genetic programming (GP) (Stenberg, J. A. (2017)), which uses the evolutionary method to optimize computer programs.

Evolutionary models (EMs) contain components that correspond to both ELC models and phase models and are intended to describe the sequences of development and interaction of model elements in the general evolutionary development model. EMs differ from each other but they are all based on the principles of evolution.

So, in the evolutionary model, in order to find general equilibrium in the group of markets under study (resources, labor, final product, capital markets, etc.), an equilibrium approach can be used: based on computational procedures, price and quantitative indicators are determined (i.e., the output of firms, populations, etc.) (Wallentin, G., & Neuwirth, C. (2017)).

The equilibrium parameters, the functions of individual and industry demand and supply in the markets are determined by the routines adopted by the firms (Wang, J., Cheng, H., Meng, X., &

Pradeep, B. S. A. (2017). However, in evolutionary models, due to the explicit introduction of blocks that reflect strategic dynamics at the mesolevel, it is taken into account that the formation of supply and demand in the markets, the real market structure in the long term is determined by the adopted strategies for functioning and development, as well as processes of changing the composition of existing objects and their strategies.

Evolutionary programming differs from genetic methods not only in the absence of crossbreeding but also in the representation of individuals in the population (Wu, B., Liu, P., & Xu, X. (2017)). Since there is no need to use chromosomes, an individual is often a real solution without additional coding.

In general, it should be noted that dynamic modeling prevails among the evolutionary economic theories: researchers single out some “features”, somehow substantiate their significance, build regressions, and get predictions. However, there is a lack of structural models with which one could study the evolution of the economy, the structure of routine, traditions, rules, and the like.

Methods

Theoretical general scientific methods (historical, analysis and synthesis, abstraction, hypothetical-deductive, system-structural, structural-functional analysis) are applied in the study of the development of the evolutionary theory of populations; empirical methods (comparison, observation, method of schematic diagrams and transfer functions) are used to determine the values of indicators of market evolutionary multipliers for various development scenarios; the methods of economic and mathematical modeling (object-oriented programming, dynamic optimization, evolutionary analysis and modeling, aggregation and decomposition of concepts, generalization and specialization of concepts) have been used for for modification and computer program implementation of the tools for economic and mathematical modeling of the dynamics of the evolutionary processes of trophic relations of enterprise populations.

Results and Discussion

In the process of changing the parameters of a dynamic system, the number of equilibrium points and their stability can change. Such changes in the nonlinear system associated with changes in the parameters of the system are the subject of bifurcation theory. Those parameter values at which the qualitative or topological properties of the motion of the points change are critical bifurcation values.

Today, the world economic system is at a bifurcation point, therefore, it is impossible to clearly determine the further paths of its development. However, it can be argued that the coming years will be characterized by increased uncertainty in the markets and new waves of crisis, and the current stage of development will be considered as a bifurcation one, during which a new global world order is formed (leader states are reorganized, the world institutional structure is accelerated, etc.).

The continuous development of economic, political, and technological processes determines the aggravation of contradictions in the system (both between elements and between different levels), which introduces it into the bifurcation stage of development.

The essentially nonlinear dynamics of interacting populations requires the combined use of both numerous and analytical methods. Analytical studies make it possible to use the results of the qualitative theory of differential equations and the bifurcation theory. They are used mainly for the analysis of bifurcations occurring in the population dynamics modeling. The main tool for proving the existence of solutions in bifurcation theory is the implicit function theorem for vector-valued functions of many variables.

During the deployment of the evolutionary process, there is a slow accumulation of quantitative and qualitative changes in the parameters of the system and its components, according to which at the bifurcation point the system will select one of the possible attractors of limit sets. As a result of this, a qualitative leap will occur, and the system will form a new dissipative structure corresponding to the selected attractor.

This happens in the process of adaptation to the changing environmental conditions. It is advisable to divide the motion of dissipative systems into two classes: the class of transitional unstable motions corresponding to the relaxation process from the initial to the limit set of states, and the class of stable stationary motions, the phase trajectories of which completely belong to the limit sets.

The presence of general patterns for the development of complex systems of any nature of origin led to the emergence of new science about the self-organization of complex systems - synergetics. The result of this interaction is synergy, and the quantified amount of synergy is a synergistic effect.

The basis of synergetics is the unity of phenomena and models that one encounters in the study of the processes of the emergence of order from chaos, that is, dissipative structures with new emergent properties.

If oscillations (fluctuations) take the system out of equilibrium, its development becomes unpredictable, qualitative changes occur in the system and new emergent properties appear. In this case, the nonequilibrium subsystem in the process of interaction with other subsystems begins to interact randomly with all elements of the system, leading to equilibrium with unpredictable results for the system as a whole.

Any of the described possibilities is realized when the system passes through a bifurcation point (zone) caused by fluctuations, in which the system acquires instability. The bifurcation point represents a critical turning moment in the development of the system (catastrophe) when it makes a choice of the further path. This is the point of branching of options for the further development of populations.

Such a process of chaotic interaction of system elements in a nonequilibrium state is a synergistic coherence. The whole system in a state of nonequilibrium, interacting with other systems, transfers disturbances to the latter, generating changes in them and determining the direction of their further development.

Self-organization as a process of coherence and orderliness of interconnections between elements of an economic system determines a change in its state. A change in the state of a system is regarded as orderliness to the result of the coherent interaction of its subsystems. It is under the influence of the synergetic coherent transfer of fluctuations in the system that it acquires new signs of its development. After self-organization, the system affects other systems interacting with it to a level adequate to itself, acting at the same time as a coincidence for such systems.

Depending on what determines the established order, the organization and self-organization of the system are distinguished. A common sign for them is an increase in order as a result of processes opposite to the establishment of thermodynamic equilibrium through independently interacting elements of the environment (also moving away from chaos by other criteria). In the course of self-organization, the system is associated with the action of forces, factors, and causes external to it. In turn, in the process of self-organization, ordered changes in the system are caused by internal factors and its inherent forces, therefore, their reason lies in the system itself.

Self-organization of populations is the ability of a system to independently maintain or improve the level of its organization with a change in the external or internal conditions of its existence, the activity taking into account past experience aimed at maintaining its integrity, increasing stability, and ensuring normal functioning and development.

The larger the number of enterprises in the population involved in restructuring changes, the more active will be the processes of self-organization. The activity of the self-organization of mesolevel systems determines the state of self-organization of the economy as a whole.

The result of self-organization is the emergence, interaction, M&A and, possibly, the regeneration of dynamic objects (subsystems), complex in the information sense than the elements (objects) of the environment from which they arise. The system and its components are essentially dynamic formations.

Depending on the influence factor, the processes of self-organization in populations can be classified as those resulting from purposeful human activity and those resulting from the chaotic interaction of subsystems of their functional units.

The reason for the disequilibrium in the development of the population and its further self-organization is, in particular, a coincidence. According to the synergistic approach to the study of economic systems, coincidence acts as a source of nonequilibrium, and depending on the nature of its origin, determines the direction of further development of the population. The most typical causes of coincidence are unaccounted patterns, the results of self-organization of other systems with which the population interacts in the course of its activities, the subjectivity of management, shareholders and heads of functional units, unidentified and unexplained phenomena, and lack of experience and staff skills.

According to the principles of self-organization, the structure of populations as the economic system will be the first to undergo a change at the bifurcation point, after it the connections of the elements of the system, their functioning, and behavior as a whole change. In the evolutionary period of development, the structure of populations provides stability, sustainability, and damping fluctuations that occur inside and come from the external environment.

Self-organization of the system is associated with the ability to self-reproduction and restoration of lost elements and subsystems, that is, to autopoiesis. Autopoiesis, inherent in natural and biological systems, is also manifested in socio-economic systems, as their core is a man.

Openness, activity, self-organization, and autopoiesis of socio-economic systems make them inert to managerial influences, that is, they respond to time-delayed management.

The main condition for adapting the production system to a dynamic external environment and an unstable spectrum of factors is its ability to adapt and create a mechanism for using favorable trends. This is ensured by the flexibility of the enterprise structure, which is understood as the ability of the system to purposefully adapt to a changing, complex environment, and with minimal cost.

The unstable state is characterized by violations in the production process, irregular production and unsatisfactory demand for it, inopportune material and technical supply, and an unsatisfactory psychological climate. This condition may be due to the influence of both external and internal factors.

If economically the system is not in equilibrium, then it moves under the influence of internal or external disturbances. In this case, different behavior of the dynamic system is realized. Depending on the structure and properties of the system, its behavior can vary significantly over time. There are two fundamentally different scenarios for the development of events after the system has undergone a certain perturbation from the outside: returning to the initial state or further distancing from it. These capabilities are described by the concept of stability.

System behavior may be subject to certain changes over time. Stationarity is a property of the processes that occur in the system and means that the nature and law of the functioning of the system do not change in time.

Any system at a certain point in time is characterized by its state and direction of movement. The population of enterprises, like any system, can be in two states: stable or unstable. These are two aspects of bifurcation theory: a stable (static) state and a dynamic one.

The static state is characterized by the rhythmic release of high-quality products and the existence of a stable demand for it, a uniform production process in all divisions, adequate logistical support and staffing, and a favorable psychological climate in the team.

As to the static approach, the researcher is only interested in the state of the (economic, social, etc.) system at a certain point in time. In the case of the dynamic approach, the subject of research is a set of system states over a certain period of time. The concept of equilibrium is associated with the state of the system.

The static bifurcation theory deals with the changes that occur in the structure of a set of functions with the change of parameters, these functions. In the case of differential equations, the

equilibrium solutions are zeros of the vector field. Therefore, methods of the static bifurcation theory are directly applicable to them.

Integration or, on the contrary, a clash of these interests without the regulatory impact of a particular subsystem can be called the adaptation process. Adaptation can manifest itself as self-regulation, self-learning, self-organization, and self-improvement. In the case of self-regulation, the system responds to environmental changes by measures and actions that are rigidly established by a special program. The self-learning of the system means its ability to change response programs. As to the self-organization, the system changes not only the response program but also the internal structure. Self-completing systems can rebuild their structure not only within a given set of elements but also by expanding this set.

Thus, the study of the conceptual synergetics apparatus leads to the conclusion that in the process of its development the system goes through two stages: evolutionary (adaptive) and revolutionary (leap, catastrophe).

The evolutionary stage of development is characterized by the presence of mechanisms that suppress strong fluctuations of the system, its components, or the environment and return the system to a stable state, which is characteristic of it at this stage. Entropy is gradually increasing in the system because as a result of the changes that have accumulated in it, in its components and the external environment, the system's ability to adapt decreases and instability increases. There is a sharp contradiction between the old and the new in the system, and if the parameters of the system and the environment reach bifurcation values, the instability becomes maximum and even insignificant fluctuations lead the system to catastrophe – a leap.

At the leap phase, development becomes unpredictable since it is determined not only by internal fluctuations, the strength, and direction of which can be predicted by analyzing the history of development and the current state of the system, but also by external ones, which makes it extremely difficult, or even impossible, to perform a forecast. Sometimes a conclusion about the future state and behavior of the system can be made based on the "law of the pendulum": a leap can contribute to the choice of an attractor, "opposite" to the past. After the formation of a new dissipative structure, the system again enters the path of smooth changes, and the cycle repeats.

In recent years, the interest in a new qualitative structure, the so-called strange attractor, with which the chaos model is associated, has increased in the theory of qualitative solutions. So, while moving from one bifurcation point to another, the system develops. At each bifurcation point, the system chooses a development path, the trajectory of its further movement.

In nonlinear dynamics and synergetics, the state of any dynamic system is characterized by the location of the corresponding point in the phase space (PS), whose coordinates are the values of the meso and microparameters on the parametric diagram.

One of the significant capabilities of dynamic modeling is the visual representation of information, especially in the case of a small dimensionality of the system for a few parameters. For this, formal spaces are used: the space of states of the parametric diagram, the parameter space, and their various hybrid variants. The values of dynamic variables or parameter values are set on the coordinate axes of the formal space, or on some - parameters, on others – variables.

The state of the evolutionary forecasting system of the synergetic effect of mergers and acquisitions of enterprises at a certain point in time in phase space corresponds to a point with coordinates $xi_{i=1,3}(t)$, y(t), NPVS(t) is a figurative point that reflects the instantaneous state of the topological (qualitative) structure of systems.

These trajectories determine the qualitative characteristics of the system. These include, first of all, the points of the evolutionary stage of development that correspond to the modes of periodic oscillations of the system and closed trajectories (cycles) that correspond to the modes of the leap phase. Whether the mode is stable or not can be determined by the behavior of neighboring trajectories: stable equilibrium, or cycle, which draws closer trajectories, and if it does not, then this is an unstable equilibrium. Finally, in light of the questions raised, the forms of loci of attraction of the various stable modes and the boundaries of these loci are of interest.

The task of high-quality mathematical models is to describe the fundamental, qualitative characteristics of the processes under study, and not their detailed characteristics. Questions arising in the process of researching such models should be of a qualitative nature. A slow change in the parameter can lead to the fact that, with the crossing of a certain critical value, the existing system mode acquires qualitative changes. Quality questions are classified into two categories. The first type of question relates to predicting which modes can be set in a given system with fixed values of its behavior parameters. The most important in this case is a qualitative understanding of the nature of the modes established in the system after a long time (at the end of the transition process). In total, various modes can be set in the system, depending on the initial conditions. Answers to questions of the first type can be obtained from the parametric diagrams of the system — the totality of all its trajectories depicted in the space of phase variables (phase space).

The second type of question is a qualitative study regarding the events that occur in the system with a change in the parameter values $xi_{i=1,3}(t)$, y(t), NPVS(t). This means the definition of bifurcation (critical) parameter values and the description of the phenomena that occur when passing through the critical values of ELC scenarios. Thus, it is necessary to divide the space of system parameters into loci with qualitatively different types of dynamic behavior - to construct a parametric portrait of the system. Such a parametric portrait, together with the corresponding phase portraits in graphical form, contains information about the possible dynamic modes in the system and their qualitative changes.

Therefore, the task of a qualitative study of the system, which depends on the parameters, is to describe all the possible bifurcations in it, break down the set of bifurcation values of the parameters at the locus and recognize them with different types of rough phase portraits, construct a phase portrait for each locus, which corresponds to it, and determine the numerical values of the bifurcation states.

A parametric study of the state of the system of evolutionary forecasting of the synergetic effect of mergers and acquisitions of enterprises is possible only by fixing part of the phase coordinates and constructing a corresponding “slice” of the parametric diagram in individual cases for different stages (recession (lethal), explerent (birth), patient (development), violent (maturity), commutant (prosperity)) of the ELC development scenarios.

In the analysis of bifurcation diagrams, special attention was paid to the appearance and possibility of controlling the oscillations of phase variables.

A parametric study of the constructed system was carried out using two-dimensional slices of the parametric space obtained in the Matlab environment. To do this, the parametric plane of the selected pair of bifurcation parameters $xi_{i=1,3}(t)$, y(t), NPVS(t) was scanned provided that the others are fixed. At each point of this plane, the type of equilibrium state of each singular point of the system under study was determined, to which different loci correspond.

Figures 1 and 2 show the parametric diagrams of the model for the corresponding pairs of ELC scenarios: the ELC scenario - recession (lethal) and the ELC scenario - commutant (prosperity).

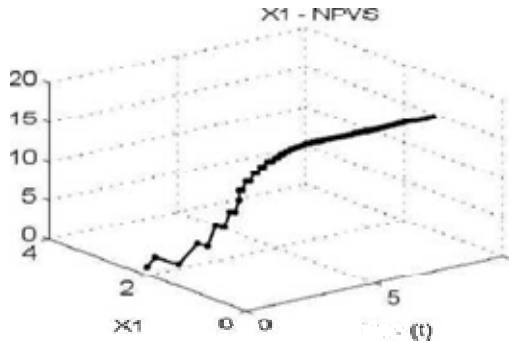

Figure 1. Parametric diagrams of the model (ELC scenario - recession (lethal))

Source: Author’s research

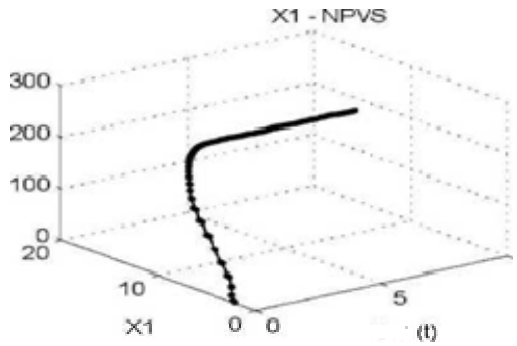

Figure 2. Parametric diagrams of the model (ELC scenario - recession (lethal))
Source: Author's research

The initial conditions determine the initial position of the point in space. The most meaningful information is the selection of only stable singular points at the studied loci of the parametric space of phase trajectory diagrams with one type of particular stability points.

The parametric study of the built system is combined with the reference point, that is, by opening blocks of integrators, the initial values are provided: x0i=1(t) = 2, x0i=2(t) = 0.01, x0i=3(t) = 0, y0(t) = 0.

The visual analysis of the obtained phase trajectories leads to the conclusion that the behavior of the information flows of different ELC scenarios is related.

In this case, a qualitative understanding of the nature of the modes established in the system after the completion of the transition process is essential. In total, depending on the initial conditions, various modes of population self-organization scenarios can be established in the system

Minor changes in the values of certain parameters of nonlinear systems cause the equilibrium to appear or disappear, change its type from unstable to stable, or, conversely, lead to global changes in the behavior of the system with the transition of the scenario from lethal to flourishing.

The convenience of displaying the process in the form of parametric diagrams of phase trajectories on the plane consists of the fact that the entire set of possible forms of transition processes under any initial conditions is presented in the form of a "phase portrait" of a single size. Thus, the phase plane, divided into trajectories, gives an easily accessible portrait of a dynamic evolutionary system that is readily accessible for inspection, makes it possible to capture and evaluate at a glance the whole set of processes that can occur under various initial conditions.

In the event of a change in parameters, the following types of system behavior can be observed:

after the loss of stable equilibrium, the new stable mode is oscillatory periodic (mild loss of stability, Fig. 1);

before the stationary mode loses stability, the locus of the extent of this mode narrows and any random disturbances eject the system from this locus before the length locus completely disappears;

the system exits steady state and jumps to the new mode of motion.

The influence on the system of both external and internal fluctuations of a different kind (including resonant ones with the system) is based on the action of two effects: a positive feedback loop and a cumulative effect. Fluctuations affecting the system, depending on their strength, will have completely different consequences for it. If the fluctuations of an open system are weak (especially the fluctuations of a critical parameter or subsystem), then the system will respond to them with the emergence of strong tendencies of a return to the previous state, structure, or behavior, and reveals the root cause of the failures of many economic reforms. If fluctuations are very strong, the system may collapse. And finally, the third possibility is to form a new dissipative structure and change the state, behavior, and/or composition of the system.

Any of the described ELC scenarios can be realized at the bifurcation point caused by fluctuations, at which the system is tested for stability. If the equilibrium is a node or focus, then the direction of motion of the phase trajectories is uniquely determined by its stability (before the reference point) or instability (from the reference point). A bifurcation point is a state of the system in which even a slight disturbance can lead to global changes in M&A.

So, while moving from one bifurcation point to another, the system develops. At each bifurcation point, the system chooses the path of further development, the trajectory of its movement.

If the system is attracted by the state of equilibrium, it becomes closed and, to the next bifurcation point, operates according to the laws inherent in closed systems. If the chaos generated by the bifurcation point is prolonged, then the destruction of the system is possible, as a result of which its components as constituents sooner or later enter another system and are attracted by its attractors. If the system is finally attracted by certain openness attractors, then a new dissipative structure, a new type of dynamic state of the system, is formed, with the help of which it adapts to the changing environmental conditions.

Systems and their components are subject to fluctuations (oscillations, changes, perturbations), which are quenched by themselves in equilibrium closed systems. In open systems, under the influence of the external environment, internal fluctuations can increase to such a limit when the system is not able to quench them. In fact, internal fluctuations are considered harmless in the concepts of self-organization, and only external influences cause a more or less significant effect. Recently, significant adjustments have been made to this situation, in particular regarding the "natural selection" of fluctuations: to realize self-organization processes, it is necessary that some fluctuations would be recharged from the outside and thus have an advantage over other fluctuations. However, in this case, the role in the development of the system of internal-origin fluctuations is underestimated. Only chaos theory indicates that the leap can be the result of internal fluctuations only.

Despite the complexity of the chaotic attractors, the knowledge of the phase space makes it possible to reflect the behavior of the system in a geometric form and, accordingly, to predict it in a certain way. Although it is practically impossible to predict the specific point of the phase space in which the system will be located at a particular time, the passage of the object of such a locus of space and its direction to the attractor are predictable.

The future of the object at the point of bifurcation is unpredictable. Their course is predictable only in the intervals between the nearest bifurcation points when events are determined by the necessary factors as random.

At the bifurcation point, there is a catastrophe - the transition of the system from the attraction locus of one attractor to another. The attractor can be the equilibrium state, the limit cycle, and the strange attractor (chaos). The system is attracted by one of the attractors and it can become chaotic and collapse at the point of bifurcation, go to equilibrium state or choose the path of a new order formation.

The fundamental point in the application and determination of the bifurcation state is the specific choice of the physical parameter that most fully characterizes it and is subject to fractal parameterization. Among the possible geometric parameters of the spatial shapes formed on the surface of the graphs, the area of the darkened surface of the bifurcation graph has been chosen since its shape, location, and size correspond to the stability loci (attractors) and the type of behavior of the $xi_{i=1,3}(t)$, y(t) parameters of the evolutionary process. To find out the bifurcation of ELC development, the image recognition systems (ImageMagick) have been used. The results of determining the bifurcation state and its size (the area of the darkened surface of the bifurcation graph in percent%) of the parameter diagrams for all ELC scenarios are shown in Table 1.

Strategic management can be considered a dynamic set of management processes that are consistently linked to each other, and there is stable feedback between them.

Table 1
Data on bifurcation state and size of the area of the darkened surface of the graph according to ELC development scenarios

$xi_{i=1,3}(t)$, $y(t)$	ELC development scenarios							
	Recession crisis (lethal)	Explerent (birth)	Patient (development)	Violent (maturity)		Commutant (prosperity)		
	1	2	3	4	5	6	7	8
$x1(t)$	3.59%	6.06%	4.82%	6.67%	4.41%	5.73%	6.03%	5.96%
$x2(t)$	25.62%	15.31%	8.18%	26.57%	19.53%	6.58%	8.38%	6.79%
$x3(t)$	7.77%	7.20%	4.10%	8.73%	6.49%	6.48%	6.35%	5.87%
$y(t)$	7.58%	11.58%	6.07%	7.32%	6.72%	4.99%	5.50%	4.98%
Dynamics of income (NPVS)	18	12	14	33	38	105	125	240

Source: Author's research

Therefore, the results of business management in the market depend on the level of IT support for analytical work, where evolutionary methods for the formation of alternative options of strategy, which allow choosing strategies depending on the ELC stages, ensuring the competitiveness of the enterprise, are of great importance.

Modern strategic enterprise management is based on IT support as the basis of analytical work. The enterprise is activity oriented on a production and requests of consumers, flexibly responds to changing conditions and in time makes changes in the organizational structure that meet the challenges of the external environment and make it possible to achieve specific benefits, which together will help the enterprise to realize its own goals.

IT support of corporate strategy for managing the evolutionary processes of enterprise development consists of several consecutive stages (Figure 3).

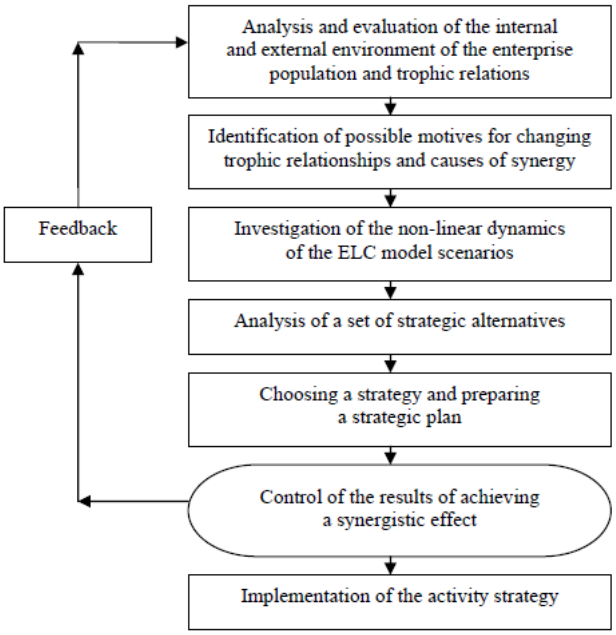

Figure 3. Diagram of IT support for a corporate management strategy of the evolutionary enterprise development processes

Source: Author's research

Stage 1. Analysis and assessment of the internal and external environment of the enterprise population and trophic relations are carried out according to the following scheme:

sets of enterprises and the interaction of trophic relations are determined, which include populations depending on the state of the enterprise life cycle (ELC);

on the basis of qualitative assessments of the external environment, the priority (most significant) indicators of the economic activity of the enterprise $\vec{X}_i = \{x_1, x_2, ..., x_n\}$ operating in the environment within the enterprise population are identified;

elucidates the values of the parameters of the ELC scenario model, the quantitative and qualitative characteristics of the influence of each factor on trophic relations in populations $xi_{i=1,3}(t), Ki_{i=1,4}(t)$ are identified.

Stage 2. Identification of possible motives for changing trophic relations and the causes of synergy.

Based on the variety of points of view on clarifying the causes of synergy, the authors determine the M&A motives, which are caused by trophic processes.

The mobilization of financial resources of the enterprise significantly affects the choice of corporate strategy: these are tax motives, diversification, reduction of financial costs, advantages in the capital market (fundraising), the difference between the liquidation and current market value of the company, the motives of shareholders, the separation of part of the business into an individual business unit, creation of the partnership.

The attraction of the strategic investors to your company. Investment motives are associated with the allocation of available funds, participation in a profitable business, the purchase of undervalued assets, the use of managerial skills, the separation of part of the business into an individual business unit, and the sale of part of the shares.

Changes in the behavior of the enterprise, requiring significant financial costs (for example, entering other markets, developing a new product, moving to a new industry).

Strategic motives include increasing business competitiveness, entering new sales markets, maintaining stability and market volumes, increasing the level of financial stability, ensuring the efficiency of managing business processes through highly qualified management, and changing the business model.

Specific functional-psychological motives include personal motives of management, attempts to increase the influence of the company administration. This group of M&A reasons and motives should include protection against hostile takeovers, that is, protection against raider attacks of enterprises, merger with a "friendly company". “Protective” motives are the possibility of growth by strengthening the market position, eliminating competitors. The interests and attitude of the owner and managers play a significant role in choosing a corporate strategy. At the same time, the attitude of company managers to risks is decisive. The personal likes or dislikes of managers can also significantly influence the choice of corporate strategy. Personnel qualifications are an important limiting factor in choosing a corporate strategy. Without qualified personnel, managers cannot choose corporate strategies, as this requires deep economic knowledge and high qualifications.

Operational motives include savings on the activity scale through the diversity of areas of this activity, the accumulation of resources and market share, the combination of complementary resources, and increased efficiency by eliminating duplicate functions in each of the merged companies.

Innovative motives include savings on the development and implementation of new IT, creation of a new type of production, goods, access to information (know-how), obtaining information about new technologies, consumers of products and services. Savings through the scale of reduction in the average cost per unit of production with a simultaneous increase in its output.

Stage 3. Investigation of the nonlinear dynamics of ELC model scenarios.

The procedure for constructing model scenarios of nonlinear dynamics of the life cycles of populations, used to develop an enterprise strategy, has the following phases:

setting model parameter values (averaged market evolutionary multipliers) for various stages of development of enterprise populations, under which phase variables will be analyzed;

determination of income dynamics in the system. Possible scenarios of population development are being investigated. Based on the information received, the strengths and weaknesses of the enterprise are comprehensively assessed, its potential capabilities, internal weaknesses, and external problems are identified.

Stage 4. Analysis of a set of strategic alternatives.

Based on the generalized results, a set of strategic alternatives for the development of the enterprise is determined. The effectiveness of an alternative strategy is assessed using the following criteria: the integrity of the strategy (under what conditions does each component affect the overall strategy); the compatibility of the strategy and the market (how much the strategy is consistent with the changing external environment), the balance of goals and available resources; consideration of possible risks; validity of timing of strategy implementation; consistency of activity of structural subdivisions of the enterprise; anticipation of possible economic risks; assessment of the impact of individual risks on the enterprise; development of measures to neutralize or mitigate the negative effects of risks, etc.

A methodological approach to the formation of a rational basis for determining strategic alternatives for enterprise development is based on the interpretation of the recognition results of ELC bifurcation state diagrams, quantitative characteristics of phase variables $xi_{i=1,3}(t)$, y(t) in space and time.

To determine the strategic choice of an enterprise, one should take into account the ELC, where at the stage of its implementation the main goal is to create a market for a new product, to provide conditions for increasing sales. At the stage of growth and maturity, the main goal is the rapid growth in various ways of sales over a long period, in particular, with the help of the modification of goods, cost reduction, and the like. At the saturation stage, when sales growth stops, the company's goal is to increase production profitability by reducing costs and other factors. At the recession stage, there is a steady decrease in demand, sales and profits. In these cases, the following strategies are possible: reduction of the price of goods, which gradually loses market demand; increase in sales promotion costs; slowing down business activity without harming one's own image and partners; removal of goods from production.

Stage 5. Choosing a strategy and preparing a strategic plan.

Implementation by the enterprise of previous corporate strategies provides certain inertia of its development. It is impossible to completely abandon all previous projects in connection with the selection of new corporate strategies. Therefore, choosing new corporate strategies, it should be borne in mind that for some time the obligations of previous years will still be in force, which will hamper the possibility of implementing new corporate strategies. The degree of dependence on the external environment significantly affects the choice of corporate strategy. The time factor should be taken into account when choosing a corporate strategy: growth; stabilization; reduction strategy. The growth strategy is implemented by:

merger is a combination of several enterprises by one owner; creation of joint ventures is the union of enterprises of different countries with the aim of implementing a joint project.

takeover of competing enterprises through the acquisition of a controlling interest;

reduction of transaction costs, increase of management efficiency, cost reduction due to vertical integration;

achieving a certain market share, oligopoly in the market, entering new markets, acquiring the status of a multinational corporation, obtaining the highest goodwill from the sale of business diversification, increasing the value of the company, strengthening market positions, entering into promising industries.

The stabilization strategy is implemented by:

optimization of the tax burden, elimination of inefficient management, diversification of production, access to innovations, application of modern production technologies and management optimization; redistribution and maneuvering of financial resources;

combining complementary resources, access to resources, consolidating the resource potential, selling as an alternative to bankruptcy, agreeing on competition conditions between the participants in the association and redistributing resources between them, eliminating debts, consolidating the resource potential and the possibility of using it as collateral in the financial market;

providing the buyer-enterprise with competitive advantages for business development by obtaining unique innovative technologies from the seller-company; competitive advantages are associated with the creation of barriers to eliminate the entry of potential competitors into the market;

increasing the efficiency of the corporation in the face of limited resources for development; fiscal minimization and optimization of taxation by paying a fixed tax; redistribution of property from inefficient management in favor of more efficient; classic performance criterion;

value-based management, the maximum increase in the well-being of shareholders; the use of transfer formation in order to minimize tax payments, in Western countries - the possibility of applying the principle of transferring losses of one company to future periods in order to reduce profits before taxing another (reducing future tax payments);

reducing costs by fulfilling obligations, increasing the level of management and coordination of the entire technological chain, improving the quality control and protecting their own IT;

"survival" in the face of fierce competition; companies are seeking growth opportunities through the acquisition of complementary assets, strengthening their market position, eliminating competitors (by purchasing them or increasing their own market share).

The reduction strategy is implemented through: reversal; separation; liquidation - if the enterprise reaches a critical point, a bankruptcy, it is liquidated, its assets are sold; choosing (changing) the location of the enterprise; reconstruction of production facilities; changes in the legal and organizational form of the enterprise, production structure, and management system; introduction of innovations; mergers, takeovers, acquisitions, and other forms of enterprise reorganization.

Stage 6. Monitoring the results of achieving a synergistic effect.

The model is based on a comparison of the state of the enterprise in the market and the ELC stage, that is, it is intended for multi-parameter strategic analysis. The basic prerequisite is that each type of business of the enterprise may be at one of the stages of ELC, so it must be analyzed based on the peculiarities of the particular stage and competitive state of the business in relation to others.

Conclusion

The synthesis procedures for the M&A synergetic effect evolutionary forecasting system have been improved using the method of structural schemes and transfer functions, which makes it possible to record the system of equations in the form of blocks with natural signs of connections and reflects the content of the process under study.

The study of the nonlinear dynamics of model scenarios of the enterprise population life cycle made it possible to identify the direction of the influence of environmental factors on self-organization processes. As a result of this influence, self-organization processes occur in the direction of a gradual improvement in the state of the industry and a decrease in the likelihood of bifurcation development in the absence of factors that neutralize such an effect.

Based on the analysis of the nonlinear dynamics of ELC model scenarios, characteristic evolutionary flow patterns of the studied populations have been found, the bifurcation analysis of possible scenarios of dynamic M&A system functioning modes using IT recognition systems has been carried out, mechanisms of the influence of the external environment and internal structure on the evolutionary model of enterprise populations have been identified.

Based on the analysis of the effectiveness of possible trajectories of the population evolution, the dynamics of the net reduced synergy effect in time of NPVS in the ELC scenario system, the parametric diagrams of the model and phase portraits of bifurcation scenarios have been

constructed, the need to identify bifurcation points and influence parameters stability loci for the transition of the system from one attractor to another, from one ELC steady state to another has been proved.

The IT support algorithm has been developed for the corporate strategy for managing the evolutionary processes of enterprise development, which will allow choosing strategies depending on the ELC stages and ensuring competitiveness.

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