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CODELESSNESS AS AN OPEN SCIENCE TOOL USED BY THE ORGANIZATIONS OF THE FUTURE

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Responding to the currently growing need for digital development in organizations, the idea of codelessness, and precisely low-code, no-code tools (LCNC), has recently experienced a surge in popularity. The introduction of such solutions may also be possible due to commonly shared platforms such as open-source software, which are an integral part of a larger concept – Open Science. Many organizations are unaware of the possible interconnections between LCNC implementation and Open Science in the organization, and there is a cognitive gap in the literature on this topic. For this reason, the main goal of the research is to evaluate Codelessness as an Open Science tool worth implementing by the small organizations. The research tool was a semi-structured interview conducted in 3 different IT-related start-up companies. The analysis of the data collected during the interviews answers the research questions, leading to the conclusion that a link exists between codeless solutions and open science, and that open-source software is the bridge to connect these two concepts. Additionally, among the most important factors influencing the choice of a given codeless solution, interviewees indicated the price of the platform, its maintenance and functionality, and, in third place, its adaptability to other systems in the organization. Continuous innovation, which is valued in a competitive market, and economic benefits such as improved efficiency and time management of employees were identified as the main advantages of codeless solutions.

Keywords: low-code, no-code, organization, open source, open science

1. INTRODUCTION

In order to remain as competitive and profitable as possible, organisations need to keep up with the latest market trends, including those largely related to technological transformation (Gërguri, 2013). Despite a great desire to use digital conveniences, many organizations, especially small ones, often give up at the very

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beginning for fear that implementing high-tech solutions will ruin their budget (Peltier, Zhao, Schibrowsky, 2012). In addition to introducing the innovation itself, there are also considerable costs of maintaining an IT employee who would be responsible for a given technological advance. However, this might not be the case with *codeless solutions* (*low-code*/*no code – LCNC*), since implementing them involves low or even no additional costs (Hyun, 2019). Currently, such solutions are most often available, without any additional fee, to the organizations that are users of common collaboration platforms such as *open-source platforms* (Dedrick, West, 2003). This is not necessarily popular, as organisations are unaware that such co-operation involves reciprocal benefits: they can gain from the resources provided, but at the same time have to contribute input and value added to the object shared with other network users (Dedrick, West, 2003). The reason for this may be that codeless solutions are not clearly categorised as one of the Open Science tools, and therefore organisations do not connect these two concepts. When considering concepts related to programming with codeless tools, the scope of reasoning is very often limited to the field of computer sciences, and the concept of codelessness itself is not directly associated with management and specifically with the currently popular broad concept of Open Science (UNESCO, 2023). This also has major implications for business practices, since organisations are often not aware that it is possible to use codeless tools on the basis of open-source code, which is among Open Science's assumptions. This state of affairs arises because the existing range of management literature describing LCNC, identified and studied in systematic literature review, does not cover the vision of integrating codelessness as part of Open Science used by an organisation.

Rejecting all existing sources from the fields of applied mathematics and computer science containing solid technical knowledge, a preliminary literature review revealed only four articles that can be categorised as showing the LCNC tools in the context of management, starting from traditional approaches through low-code platforms as a tool for inexperienced users to their functional and system requirements. Such a cross section is shown in the article by da Cruz et al. (2021). In expert research, Di Ruscio et al. (2022), compare low-code programming platforms and analyse their benefits and limitations. The sources also include an evaluation of low-code/no-code platforms used by small and medium-sized companies on the Polish IT market, followed by a study that resulted in a ranking of existing LCNC platforms based on the qualities that they provide (Domański et al., 2023). Moreover, there is just one existing review that examines the current literature on LNC platforms, including its usability, essential aspects, and user perceptions (Pinho, Aguiar, Amaral, 2023). Additionally, there is a significant gap when it comes to clear advantages and disadvantages of implementing codeless-based solutions in organizations' daily operations. Existing sources cover the pros and cons of LCNC tools (da Cruz et al., 2021; Nour Eldin, 2024), but only one article discussing the benefits and limitations of implementing LCNC in an organization was identified during the systematic literature review (Trieflinger et al., 2024).

Addressing the aforementioned cognitive gap, the main goal of the research is to bridge it by *evaluating codelessness as an Open Science tool worth implementing in small organizations*. In order to successfully achieve the stated objective, the research will seek to answer the following questions: *What is the connection between the current state of codelessness development and Open Science assumptions made by organizations? What are the advantages and disadvantages of codeless tools implementation by organizations?* The whole study is divided into two parts: a theoretical part, based on a deep systematic literature review, and an empirical one, based on qualitative research, conducted using a semi-structured interview, carried out with 3 managers of start-up companies performing in IT areas. After identifying possible organisational implications, this allows conclusions to be drawn about the stated goal.

2. THEORETICAL BACKGROUND

The exact literature review was approached in a systematic way using literature databases such as *Web of Science* and *ScienceDirect*. The selection of literature databases was dictated by their reliability, popularity, and the availability of sources without additional fees. In the further stages, keywords were defined and the actual review begun. Due to the fact that the research touches on two distant fields, namely, management of Open Science in organisations and the implementation of code-free software solutions from the periphery of IT science, appropriate keywords were defined for each of these categories: for the field of management these are *open science* and *organisation*, while for the second category these were *codelessness or low-code/no-code* and *open source*. These keywords were searched for among titles and abstracts. In order to expedite the process, the database was partially supplemented, using the "snowball" method, with publications included in bibliographies of identified and already accepted sources (Czakon, 2011). The wide access to literature sources and their scope necessitated clear exclusion criteria for the literature review. The following items were not taken into account in the search process, which was conducted in the first half of 2024: items repeated in various search attempts, in different databases, items that do not constitute an original source of information, items going far beyond the area of interdisciplinary management, mainly in specialized IT and legal fields, items describing a specific project or a detailed case study, and items published before 2000.

3. CODELESSNESS – TREND NEEDED BY THE MARKET

Analysing the market trends of the last few years, a change can be seen in the list of occupations for which the demand exceeds the number of willing candidates several times over, resulting in market talent gaps. This growing phenomenon

may significantly affect business operations and, according to Gartner, who considers the talent shortage to be one of the biggest threats to organisations, companies will even have to completely redesign their HR strategies (Lavelle, 2019). Surprisingly, one example of such positions is the profession of software developer; despite the prestige it has gained over the years, companies describe this as a position that is difficult to fill. This is due to a substantial and sudden increase in demand for programmers from companies pursuing ever-changing technological transformations. The CBNC report found that more than 920,000 IT developer positions in the US went unfilled in the September-November 2019 period alone, costing companies significant time and money to find suitable candidates for these vacancies (Liu, 2019). Fortunately, along with the development of technology, innovative solutions and tools addressing problems associated with the IT developer shortage have also emerged. A prime instance is codelessness, and specifically low- and no-code (LCNC) solutions, which are growing in popularity, since the operating tools based on them do not require professional programming experience (Woo, 2020). It is even mooted that the global shortage of developers has significantly enhanced the importance of LCNC platforms, particularly for smaller organizations, which often struggle to compete for the best IT talents on the market, losing out to tech giants such as Google or Microsoft (Lebens et al., 2021). When analysing the entry of code-free solutions into the market, it is also worth noting that the roots of this solution go all the way back to the 1970s (Sassi, 2021), when the first 'drag-and-drop' interfaces were launched, though these were not as structured, comprehensive nor widely available as currently. LCNC technology slowly started to find its adherents much later, when new programming standards were developed. It is claimed that the low popularity of LCNC was due to inadequate adaptation of the programming standards. However, according to the literature, this phenomenon can be additionally related to limited awareness of the importance of technology in organizations' competitiveness or the insufficient supply of programmers to satisfy the labour market in this area (Kasiewicz, Kurkliński, 2023). The term 'codelessness' and specifically 'low- or no-code definition' has two primary sources, which are considered most relevant for the purposes of this study. The first hints at its functionality, as the term 'low-code' has been combined with the term 'no-code', introduced by Forrester in 2014 to classify software platforms focusing on programming simplicity vs. ease of use. According to Forrester (2023), low-code platforms require minimal coding and allow for quick delivery of business applications with little initial investment in configuration, employee training, and tool deployment. Gartner (2022) proposed the second most popular definition of LCNC, according to which, LCNC is a platform that provides integrated tools for faster application delivery.

LCNC tools' users may create applications on their own in order to boost work productivity simply by querying relevant commands. In such solutions,

drag-and-drop technology is most often used to combine pre-coded components into customizable applications. So-called 'modular approach applications' are incredibly flexible, simple to design and highly intuitive (Hyun, 2019). Crucially, instead of extended technological knowledge, they demand certainty in what users expect from the tool being created so that it fully meets their needs. The fact that users themselves can create and maintain their own application also reinforces the idea that in the high-tech age, a strong emphasis should be placed on human beings as a significant factor in world's technological transition because they control its creation and manage it (Kumar, 2009).

4. CODELESSNESS IN THE OPEN SCIENCE CONTEXT

The literature provides a broad understanding of the concept of Open Science. At the beginning, it is worth mentioning its roots, which date back to the seventeenth century, when a scientific revolution occurred. This consisted in a transformation in thinking from a situation where striving for development by keeping secrets and activities in narrow circles of court intelligentsia changed to one in which collaboration was acknowledged as bringing greater benefits and new perspectives, and shaping various organizational structures (David, 2008). Over the years, the scientific outlook on Open Science has changed rapidly, as the very object shared with other scientists or the society has diametrically changed (Crüwell et al., 2019). Knowledge sharing and its development have taken on newer and newer forms, evolving and broadening the concept itself. Companies are progressively embracing open science because it generates economic value and new potential for innovation and expansion. It allows more individuals to participate in all aspects of research, fostering collaboration and partnerships that result in quicker, more accurate answers (Gentemann, 2023).

Summarising the origins of this concept, which dealt mainly with growth in Renaissance courts, then considering the transformation of the term, and finally the current state in the perspective of organisation, it can be noticed how it has been reflected in various facets of life and range of time, which is also strongly underlined by Vicente-Saez and Martinez-Fuentes (2018), whose analyses of multiple characteristics from distant backgrounds sought one general definition applicable to all aspects in which Open Science can be used. The following definition proposed by Vicente-Saez and Martinez-Fuentes (2018) is verified and recognized for the purposes of the following study: 'Open Science is transparent and accessible knowledge that is shared and developed through collaborative networks'.

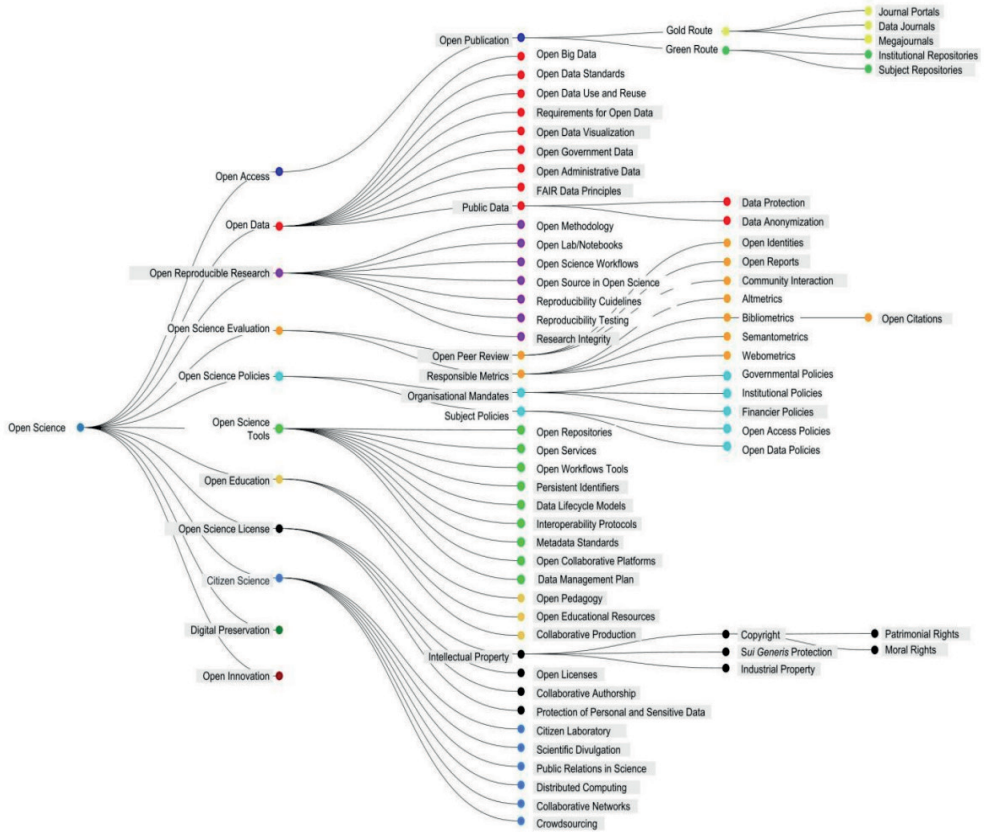

Fig. 1. Open Science Taxonomy (Silveira et al., 2021)

As figure 1 illustrates, Open Science, which is usually widely associated only with Open Access, has in fact various different branches, each of which seeks to ensure that the objectives set by the overarching concept are met as far as possible (Silveira et al., 2021). The study focuses on one of these branches, which has a particular correlation with the low- no-code solutions discussed earlier. In the assumptions of the *open source movement*, programmers freely share their code with the rest of the community that uses open sources in the aim of constant software development. As a result, open-source platforms provide users and developers with access to the source code, which they can use and modify as needed, before sharing it with others (Lerner, Tirole, 2000). What mainly differentiates commercial tools from open source is that the second group is widely available, modifiable and that such software is most often free to use (Weiss, 2000). Although open source now seems to be extremely popular and is used on a daily basis by many organisations, this was not always the case. In the 1960s and 1970s, software development was mostly done by scientists and engineers

working in academic, government, and industry labs. They recognized it as being standard in their research setting to openly share, edit, and develop software, both individually and collaboratively. Because the internet did not have such a wide reach at the time, only a limited number of people used published source code. As the technology advanced, competition in the IT sector grew, leading to the developers feeling robbed when others could utilize their work free of charge (Von Krogh, 2003). Their perspective on the matter changed considerably, as they realised that instead of just sharing their work, they would also be able to benefit from the knowledge of others, exchange expertise on an ongoing basis, share problems together, and most importantly, develop constantly. Many researchers, observing the growing success of open-source software, state that open source could be most possible answer to the software crisis. Some open-source enthusiasts even claim that software will be open or will not exist at all in the future (Fuggetta, 2003). The link between one of the Open Science tools, open source, and the subject of codelessness is particularly important, as the vast majority of codeless tools currently contain open-source software components, which makes LCNC technology itself an open-source solution and therefore also an example of Open Science that companies can use to boost their productivity (Kasiewicz, Kurkliński, 2023).

5. IMPLEMENTATION OF CODELESS SOLUTIONS IN ORGANIZATIONS

Extending the concept of using codeless solutions as an implementation of Open Science in the context of organisations, it is important to acknowledge that the majority of sources confirm there are still few correlations between academic and managerial-practical knowledge and that the integration of open science into organisations is more likely to change organisational direction (Evans, 2020). At the same time, the authors agreed that the existence of such a correlation is highly desirable because of the many benefits it can bring. There is a great need to make better use of scientific knowledge, not only in its final stage, when companies acquire the right to use it, but also at earlier stages of its development (Kafouros, Forsans, 2012). Here, the best example of combining continuous learning with the real process of creating an application that will help organizations in practice is the implementation of a codeless solution and a strategy based on it. There is a great need to collaborate in order to obtain the highest quality management and organisational research knowledge. This need is accelerated when one considers the global conditions of humanity, characterised by the challenge posed by the climate crisis, growing economic inequalities and various wars. Within all the transformations taking place in the creation and use of knowledge described above, open science is of particular

importance (Rodriguez-Pomeda, Serrano-Lopez, 2023). While the organisational transformation brought about by the implementation of codeless solutions and the shift in strategy towards open science will certainly bring many benefits to organisations, it may also have its drawbacks and limitations. To explore this, a qualitative method was employed for the empirical part of the study.

6. METHODOLOGY

In order to fill the gaps identified in the systematic literature review and thus answer the research questions, a descriptive qualitative study was conducted and interpreted in the second half of 2024. The research instrument was a semi-standardised in-depth interview conducted with 3 managers among startups located in the Polish city of Łódź, all of which are active in the field of IT solutions. This technique was chosen due to the fact that potential respondents may have been at a completely different stage of introducing codelessness as open source, which excluded the option of asking standard questions and obtaining sparse answers. In this individual interview, respondents were encouraged to speak freely using a rather informal measurement tool (Appendix 1. Interview Sheet). As this is a qualitative study, the managers interviewed talked about their awareness of the opportunities associated with implementing codeless solutions via open-source software. The interview consisted of 5 open-ended questions and a number of additional queries, which were structured according to the sources analysed. The aim was to be able to pick out details that later helped to fill in the gaps in the literature.

Due to the fact that the companies chosen are still emerging on the market and wish to remain anonymous, they were named A, B, and C for the purposes of this article. The purpose of the company is the same for all three businesses and is to provide innovative IT solutions. What distinguishes them from other companies is the length of their market presence and the types of solutions and projects they implement and consequently propose to their customers.

Company A: 2.5 years on the market, at the intersection of the IT and accounting sectors, providing its customers with innovative solutions in support of accounting matters.

Company B: 4 years on the market, serving diverse needs of clients from many different sectors, including industry, marketing, HR and even government.

Company C: 2 years on the market, creates dedicated IT systems for its customers based on their preferences and individual needs, serving most often local brands.

7. RESULTS

After conducting the interviews described in the methodology section, an in-depth evaluation of the responses was carried out, based on which the following conclusions were drawn.

The first outcome to start with is that none of the companies use a completely code-free solution. Only company B uses low-code tools and the reasoning behind this was explained as follows "[…] we are thinking of using completely codeless solutions, although at the moment our projects are too large and extensive to be done with completely codeless tools. We use low-code as a support for our daily tasks, sometimes even whole small projects use low-codes". Nevertheless, all of respondents have practical experience with the codeless tools, as they are closely involved in their implementation. Another important point concerns the purpose for which companies use or are planning to use code-free tools. According to company C, this is "[…] to do small projects and to relieve our employees of repetitive and uncreative work […]", which is also confirmed by the response from company A, stating that "[…] already all of our employees create a dedicated *programme* for the required purposes but still a lot of tasks are done manually. So why do we not give them the ability to have a flexible and, most of all, an easy solution to create things that will improve their daily work life?" These answers prove that all of the companies surveyed point to small projects or relieving staff from working on repetitive parts of the code as the main utility of the solution.

All companies unanimously indicated the price and the corresponding functionality of the programme as crucial factors in deciding on the software for code-free tools. Company B, which had already made a choice of software, indicated that "Compatibility went hand in hand with price, which was very important in the choice of software". It is also emphasised by the representative of Company C, stating that "The most important factor here is the ratio of invested money to the possible profit. Most solutions I have heard of are very expensive to implement and maintain – I consider this as the first factor". In second place regarding crucial factors when choosing the most appropriate software were responses relating to UX Design (User Experience), i.e. the functionality and simplicity of the tool and their intuitive use. According to Company A, "[…] when discussing the choice of platform, the most important thing was functionality and intuitiveness in use. We want the platform to be able to respond to our needs every step of the way, just as we want to offer our customers our services". The respondent from Company B also admits that tools simplicity was an important factor, explaining that "For me as a manager, it was important that people got real simplification in their tasks. Not something that is supposed to make things easier but in reality is difficult to use – and we tested such tools too". This particular factor is also confirmed by the interviewee from Company C, who

emphasises that "Then (after above mentioned costs) there is the functionality and user-friendliness".

None of the companies use open-source software solutions, but in the case of Company A and C, it is taken into consideration when taking the decision to implement codelessness into the company's operations. Company A admits that "[…] platforms using open-source software are highly taken into account, mainly because of its affordability and the fact that we have been operating on such platforms for some time now and see many benefits from it". Choosing open-source software-based platforms is also confirmed by Company C: "If we reach the stage of making certain decisions, we will definitely consider platforms offered through open-source software". Only Company B, which has already made a distinct choice, has a different opinion, based on the lack of compatibility between OSS and other systems that the company had installed previously.

When introducing code-free solutions, the human aspect of how employees will react to this change seems easy to some and a cause for concern to others. Company A admits that "this is quite a revolution, and as with any revolution, people can 'suffer' from it. Suffer' is used colloquially because our team is very flexible and therefore more resistant to the stress of very dynamic change", while both Company B and Company C are confident about their employees, their morale and positive attitude when implementing change. According to Company B, "The change in the human factor was also very fruitful, because our employees are passionate and knew about these technical innovations beforehand and it was really their own initiative". This is also confirmed by a statement from a representative of Company C: "I believe that the easiest issue will be the change in human work. […] I believe they would perceive this change positively and quickly find the best ways to utilize the implemented systems".

All the companies agreed on the advantages and disadvantages of implementing codeless tools, as presented in table 1.

Table 1. Advantages and disadvantages of codeless tools implementation

Advantages
• **The introduction of code-free solutions demonstrates a company's innovativeness, which is a much-appreciated feature in the competitive market.** "Thinking about codelessness, the first thing that comes to my mind is innovation. Although we have had codeless devices on the market for quite a few years now, in many companies, the introduction of such solutions is still a dream". ~ Company C • **It saves staff time and thus allows them to be more efficient.** "I think there are a lot of advantages, ranging from simply being up to date with technological developments, which is very important nowadays, to all kinds of improvements such as increasing the efficiency and flexibility of the team, speeding up and facilitating their work, but also offering customers the latest solutions, tailored to their needs". ~ Company A "The biggest advantage is the enormous gain in time and morale in the team, which used to be very depressed by having to rewrite these same parts for every programme, now they can focus on more creative work, so as I can assume it is a win-win situation for both employer and employee". ~ Company B "Another matter I'm thinking about is significant assistance, the kind of help that employees receive, a sort of facilitation aimed at simplifying and speeding up their work – these are undoubtedly the advantages of this solution". ~ Company C • **It develops those team's capabilities that are crucial in the 21st century.** "Using codeless tools requires a kind of logical understanding of the information system, which in an ever more automated world full of algorithms is a very useful skill". ~ Company A "Another one of them could be the development of human skills; sometimes there are topics that can simply be difficult for an employee, and the inability to tackle them generates frustration, especially among the most ambitious workers. No-code solutions can quickly and easily lead them to the most optimal solution". ~ Company C
Disadvantages
• **Solution and its maintenance can be expensive.** "The disadvantage is that these tools are expensive, and in addition to the one-off fee, there are also monthly subscriptions, which are still very high compared to other applications". ~ Company B • **Depending on the software, functionalities may be limited, sometimes insufficient, thus failing to fulfil their purpose.** "Moreover, we discovered that the flexibility of low-code platforms is not as wide as we supposed it to be, so for the repetitive parts it's working, but if we want to make a small change in the programme, which is possible, this requires a bigger volume of work from us". ~ Company C • **Implementing the solution requires a strong commitment and organisational infrastructure.** "[…] not forgetting that such an implementation involves a lot of training, coaching and, above all, time spent understanding code-free tools, which are not necessarily easy at first glance". ~ Company A "[…] I can mention the extensive infrastructure accompanying the implementation of solutions, and here I mean not just the application itself, but all kinds of training, training environments, and preliminary projects on which we will be *testing* the applications, which also won't be perfect right away". ~ Company C

Source: own elaboration based on interviews.

8. DISCUSSION & CONCLUSIONS

Recalling the gap identified in an existing literature on the lack of connection between codelessness and open science, precisely open source in organizations, it is additionally confirmed by the interviews, as no company uses open-source solutions in this area of codelessness. Despite the fact that they are aware of this option, the available sources of knowledge on the subject are scarce. Just as the authors in the literature review agreed that there is a need to transfer science into the entrepreneurial-managerial sphere (Fuggetta, 2003; Evans, 2020), the interviewees also confirm that there is a need to discover new applications and functionalities in their companies. Companies want knowledge workers who, with their creativity and not with repetitive tasks, will bring a cognitive process that puts the company at the forefront of competitiveness. When considering the human factor in the implementation of codeless solutions, one must acknowledge the ambiguity of the respondents. Literature sources acknowledge that human beings should be at the centre, controlling the digitization changes (Kumar, 2009). This is an important issue that brings positive feelings to only some respondents. It can be seen from the interviews that not all companies have reached a level where the human being is in charge of change, but rather a passive user of it. It is thought that this may be due to there still being insufficient knowledge about innovations such as codelessness and that this stems from a lack of conviction, leading to hesitation and fear.

Both the literature analysis and the interviews allowed the topic of codelessness to be evaluated in the context of open science in organizations and find answers to before research questions. It should be noted that a link exists between codeless solutions and open science through the use of open-source software. While this solution is not very popular among companies, despite the ongoing digitalization of businesses, it may become more popular through its very convenient price, since alongside functionality, price is one of the key factors for businesses when deciding on an appropriate tool. When choosing a solution based on open-source software, price therefore becomes insignificant. Moreover, this research identified the advantages and disadvantages of introducing codeless solutions into an organization. Among the main advantages, respondents pointed out that using such solutions means the company is up to date and developing in a spirit of innovation, which is valued in a competitive market. In addition to this, the economic benefits for business were highlighted, such as time savings for employees, improved efficiency and involvement in creative projects. Another issue is the fact that introducing codelessness forces organizations to develop their employees' skills, which drives the digital evolution of the 21st century. Among benefits of LCNC implementation in the organization, Trieflinger et al. (2024) mention economic savings such as cost reductions and shorter development time, resulting in better staff utilization and efficiency. Although this study does not mention boosting company employees' skills, it can be strictly connected to the job satisfaction that is identified as an important plus.

One of the most frequently mentioned disadvantages was that the introduction of such solutions requires significant organizational work and funding. It is necessary to invest both in the entire software infrastructure, which is the greatest expense, but also in a series of training courses for employees, including a training environment. Trieflinger et al. (2024) confirm the above-mentioned disadvantages of initial investment, total cost of infrastructure and maintenance, and also add technical department, security risk and lack of flexibility to this list. The interviewees' lack of awareness of these recent limitations may indicate that their LCNC implementation is not yet at such an advanced stage and that they were only commenting on potential opportunities and weaknesses. This suggests that the research could be extended over time and re-studied once these organizations have gained greater experience in this area. Balancing the disadvantages with the potential benefits of implementing a codeless solution, it is safe to say the pros far outweigh the cons. Although the study met its objectives, a potential follow-up study on the topic could address improvements. In order to overcome the limitation of an unrepresentative research group, it would be beneficial to expand the geographical area from which companies are surveyed and establish the level of implementation of the solution, even if merely preliminary.

APPENDIX 1. INTERVIEW SHEET

Name of the organization:

Representative:

Position:

Short company description:

Question 1. Is the company using codeless solutions? *Additional questions: If not, is the company considering the usage of codeless solutions? When and for what business purposes it was/will be created? Are the solutions that you are using based on the open-source software platform?*
Question 2. What factors have/are/will you taken/taking/take into account when choosing the most appropriate platform for introducing codeless solutions?
Question 3. Were/Are open-source software platforms chosen to implement the codeless solution? *Additional questions: If not, were open-source software platforms considered? Was the project implementation team aware of this possibility? If yes, what were the arguments in favour of using open-source software platforms and what were the arguments against?*
Question 4. From the management point of view, taking into consideration both the process itself and the human factor, what were/can be the challenges and trivialities during codeless solutions implementation phase? *Additional questions: Can OOS platforms be helpful in implementing codeless solutions? Can any unexpected challenges appear in implementation phase?*
Question 5: According to your experience, what are the advantages and disadvantages of codeless tools implementation in the organization? *Additional question: Were the conditions of fulfilling the business purposes met? Was the given process streamlined in the desired way? Were there any unexpected limitations in platform usage?*

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BEZKODOWOŚĆ JAKO NARZĘDZIE OTWARTEJ NAUKI WYKORZYSTYWANE PRZEZ ORGANIZACJE PRZYSZŁOŚCI

Streszczenie

W odpowiedzi na rosnące potrzeby rozwoju cyfrowego w organizacjach idea bezkodowości, a dokładnie narzędzi low-code, no-code (LCNC), zyskała ostatnio na popularności. Wprowadzenie takich rozwiązań może być również możliwe dzięki powszechnie udostępnianym platformom, takim jak oprogramowanie Open Source, które są integralną częścią większej koncepcji – otwartej nauki. Wiele organizacji nie zdaje sobie sprawy z możliwych powiązań między wdrożeniem LCNC a otwartą nauką w organizacji. Ponadto istnieje luka poznawcza na ten temat w literaturze. Z tego powodu głównym celem badania jest ocena bezkodowości jako narzędzia otwartej nauki wartego wdrożenia przez małe organizacje. Narzędziem badawczym był częściowo ustrukturyzowany wywiad przeprowadzony w trzech różnych firmach typu start-up z pogranicza dziedzin IT. Analiza zebranych wyników, oprócz odpowiedzi na postawione pytania badawcze, pozwoliła na przyjęcie poniższych założeń. Główne wnioski płynące z pracy potwierdzają, że istnieje związek między rozwiązaniami bezkodowymi a otwartą nauką, a pomostem łączącym te dwie koncepcje jest wykorzystanie otwartego oprogramowania. Dodatkowo wśród najważniejszych czynników wpływających na wybór danego rozwiązania bezkodowego ankietowani wskazywali cenę platformy, jej utrzymanie i funkcjonalność, a na trzecim miejscu jej adaptowalność do innych systemów w organizacji. Jako główne zalety rozwiązań bezkodowych wymieniono ciągłą innowacyjność, która jest ceniona na konkurencyjnym rynku, oraz korzyści ekonomiczne, takie jak poprawa wydajności i zarządzania czasem pracowników.

Słowa kluczowe: niskokodowość, bezkodowość, organizacja, otwarte źródła, otwarta nauka