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Article

Workforce ecosystems as a model for human capital management in the digital age

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Abstract: This paper discusses the use of workforce ecosystems to manage human intellectual capital. The need for work ecosystems has emerged in the digital age because of the rapid growth in the number of engaged partners and freelancers in the digitalization of enterprises. It is shown that this growth is directly related to the use of agile management systems in design and development: agile, DevOps, microservice architecture, turquoise practices, etc. The information systems needed to manage workforce ecosystems should have competency-based metrics to link business needs, recruitment and training, and finding new partners. At the same time, training should be prioritized over recruitment and the search for new partners in the context of staff shortages. When automating workforce ecosystems, a platform approach should be used to integrate both corporate HR, time and business process management systems, and similar systems from partners.

Keywords: workforce ecosystems; digitalization; innovation; HR management; digital platforms; agile management systems

1. Introduction

Apparently, one of the first to talk about the ecosystem approach to labor management was the renowned scholar and educational innovator David Feingold. In his 1999 paper, "Creating self-sustaining high-skill ecosystems", Feingold (1999) analyzed the role of high-skill ecosystems in the high-tech workforce. He showed that despite more developed education in Germany and Japan, the ecosystem approach in the United States, linking education and business, was more effective, as evidenced by the success in the technological development of U.S. companies. Applying the ecosystem approach to labor at the macroeconomic level is a challenge for governments. However, with the development of the digital age, labor market problems have become so acute that they can no longer be solved by ministry regulation alone but require the involvement of business itself at the corporate level.

The digitalization of the economy is not only increasing the need for skilled information technology (IT) personnel. The shortage of IT professionals could simply be solved by retraining employees released as a result of automation. Digital transformation leads to the emergence of a huge range of new services that are created not only by large businesses but also by various small businesses, start-ups, universities, etc. The lack of integration between a huge number of participants in technological innovation leads to a total shortage of personnel; there is simply no one to train anymore. In this regard, the use of an ecosystem approach to labor resource management, which can significantly reduce staff "hunger", becomes extremely relevant.

In 2021, research on labor ecosystems was initiated by the MIT Sloan Management Review and Deloitte. The first paper published as part of this research was entitled "The future is for labor ecosystems" (Altman et al., 2021). The authors defined workforce ecosystems as "a structure consisting of interdependent participants inside and outside the organization, working to achieve both individual and collective goals". According to a survey of CEOs conducted as part of this research, an overwhelming number (about 90%) stated that they consider the capabilities of external specialists in their work. Therefore, they need to be managed in the same way as their own employees.

A study by the same authors from 2022 (Altman et al., 2022) was devoted to analyzing how important labor ecosystems are for business development. In particular, it was found that among companies that manage labor ecosystems, 87% of executives believe that their workforce is aligned with strategic business goals, while in companies that do not manage labor ecosystems, only 36% of executives said such alignment. In the MIT Sloan Management Review 2023 publication (Altman et al., 2023), the authors raise the issues of integration architecture (information systems) for labor ecosystem management. The analysis of companies' experiences shows that, in this respect, we can rather talk about experiments than about large-scale implementations.

Thus, the topic of corporate governance in labor ecosystems is extremely relevant today. Not only are there no ready-made information systems for such management, but there is not even sufficient experience and understanding of what such systems should include. In order to answer some of these questions, it is necessary to understand what tasks labor ecosystems address primarily. In addition, we need to define the metrics of governance in them. And only then will it become clear what solutions should be used in the creation of workforce ecosystem management information systems. Some answers to these questions will be given below.

2. Research methodology and building of the workforce ecosystems

The research methodology for building workforce ecosystem models in this study was based on approaches that are used to design corporate systems. These are primarily architectural, ecosystem, and flexible approaches. The architectural approach assumes that the functions of information systems should be subordinated to the goals and objectives of the organization. The ecosystem approach assumes the interconnection of systems, due to which all personnel management systems in an organization should be connected to similar partner systems.

A flexible approach assumes the adaptability of information systems to changes. In the digital era, the center of competition between enterprises is shifting to the technological side, which requires a significant acceleration of innovation. According to the Digital Vortex 2023 study conducted by the Global Center for Digital Business Transformation of the International Institute for Management Development, such industries as finance, telecommunications, education, and professional and technological services are in the zone of digital transformation today (Shan and Wade, 2023). Companies in the industries that have found themselves in the center of the "digital vortex" must restructure their work in order to organize a continuous process

of development and implementation of innovations in the field of digitalization. First of all, it concerns project management, which is conducted according to the agile methodology (Agilemanifesto, 2001), which implies the realization of goals that can change in the process of their achievement.

But agile is not the only example of agile management systems. In the field of software development, the DevOps methodology (Gokarna and Singh, 2021), which combines the tasks of development (development) and maintenance (operations), is becoming a standard for innovative companies. DevOps includes not only development and maintenance but also testing, checking for information security, versioning, etc. All these tasks are realized with the help of appropriate technologies that allow automation of most of the operations. The DevOps technology stack consists of dozens of different solutions. But not only the solutions are different, but also the groups of specialists who implement them. And quite often, in the practice of enterprises, groups of specialists may be staffed by different companies and organizations. For example, testing can be performed by a third-party company specializing in testing the operability of the developed software. Separate modules can also be developed by partner companies. All this requires coordination, not only in solving the tasks themselves but also in interaction between specialists from different companies. Conventional human resource management systems will not help here; workforce ecosystems are needed.

Innovative companies today are also experimenting with flexible organizational management structures that include turquoise techniques, sociocracy 3.0 approaches, etc. (Slavin, 2022). Such management structures use self-organization tools that allow employees to choose their own forms of cooperation, both within the organization and with external partners. In flexible organizational structures, the work with personnel can no longer be attributed to resource management because employees perform both resource and management functions. We can say that self-organizing workforce ecosystem management systems do not differ fundamentally from partner or customer management systems, in which neither partners nor customers are resources. Hence, we can conclude that workforce ecosystems are systems of partnership relations between participants in workforce processes, regardless of the organization in which they work.

Another example of flexible management systems is the use of microservice architecture by innovative companies for their information systems (Newman, 2016). If earlier the information systems of companies consisted of rather large program modules that implemented a particular business function (e.g., customer relations, supply chain management, financial planning, and accounting), today the information systems implement small functions (microservices) that can be quickly developed and implemented within the framework of agile methodologies such as scrum. Such functions can be services both for users (for example, a mobile application or a chatbot for a client) and for other applications (for example, a data analysis service or a report generator). Microservice architecture, which has now become a standard for all organizations at the center of the digital vortex, leads to a dramatic increase in the number of partners involved in creating such services.

Previously, companies had only a few technology partners who helped develop and implement large automated systems such as ERP, CRM, document management,

etc. With the transition to a microservice architecture, the number of partners helping to automate the enterprise begins to be measured in dozens, and it should be considered that the human factor (competence of specific specialists in the partner) in the implementation of digitalization tasks is much more important than in other types of activities. All of this also requires special tools for managing human resources that allow monitoring the solution of tasks and the availability of sufficient competencies among the employees of partner organizations. In practice, it is not uncommon when the departure of a qualified employee from a partner organization leads to problems in solving enterprise tasks. Workforce ecosystems are designed to monitor such problems.

3. Features of human capital management in workforce ecosystems

The role of human capital, as well as the role of human intelligence, is growing in the transition to the knowledge economy. This is due to the fact that the share of routine work as a result of automation and robotization processes is falling, and human intellectual and creative abilities are increasingly in demand. The level of human capital today directly affects the potential capabilities of businesses and countries in technological development. It is no coincidence that since 2018, the World Bank has been rating countries according to the Index of Human Capital (IHC—Index of Human Capital). So, for example, according to the level of the IHC (2020 rating, updated for the end of 2022 (The World Bank, 2020)), Russia ranks 41st (1st place—Singapore, the United States—35th). However, in this paper, we will be interested not in human capital in general but in human capital in organizations. Since Stewart's (1999) time, human capital in corporate management has been considered one of the components of intellectual capital (IC) and is also called human intellectual capital. Human capital, as a component of intellectual capital, is directly related to knowledge management (Maddocks, 2002). In the study of Slavin (2019), it is shown that human IR is not the knowledge of the organization in general, but implicit knowledge that is inseparable from the person (Nonaka and Takeuchi, 2001). It can be said that human ICs are those people who transform and change the company.

If we consider a company's full-time employees, human IC can include management (to the extent that it develops the company), technologists (who create new products), and IT specialists engaged in the company's digital transformation. However, it is not difficult to understand that in a modern company that develops innovatively and with a significant advance, employees of partner organizations, consultants, freelancers, and sometimes even clients take part in its development and transformation. Thus, human IC includes both regular employees of the company and external employees (employees of partner organizations, freelancers) engaged in the development of the company. It is human IC that should become the main object of management in workforce ecosystems.

In order to manage any object, it is necessary to be able to measure its state. A convenient tool for measuring human IC is the competence metric. A person's competencies are his/her abilities (and those confirmed in practice) to use his/her knowledge, skills, and abilities in labor activity. A competency-based approach is used today in most countries around the world to link education and labor activities.

Businesses formulate requests for labor resources in terms of competencies required for their activities, and educational organizations formulate training programs that develop certain competencies. In many countries, this approach is used not only by businesses but also by authorities to organize the activities of civil servants (Vasilyeva and Slavin, 2018).

Modern models of corporate competence management described in various standards (for example, in the European ICT competence framework (ITPE, 2019)) imply the following steps: The first step is to identify the whole range of competences (technical and organizational) that are necessary to have now and, in the future, to realize the goals and objectives of the organization. The second step is the identification of the existing competences of employees and partners of organizations. At the third step, competence development plans are formed in three directions: training of employees; search for new employees; search for new partners or freelancers. Competency development planning should be consistent with plans for implementing the organization's goals and objectives. However, the ecosystem approach assumes that both partners and freelancers are one with the organization's full-time employees, which means that learning processes should apply to all. **Figure 1** shows the organization's competency development framework to be implemented within the organization's work ecosystem (all the diagrams in this article were compiled by the author).

Figure 1. Framework for corporate competence management in workforce ecosystems.

At all stages of competence management (determination of competences required by the organization, identification of existing competences, planning of training, and search for employees, partners, and freelancers), it is necessary to develop a corporate model (classifier) of competences, which will be the metric of the whole process of competence management. The model should be of a basic nature and should not change more often than the company's strategic goals change. Training (for both in-house and external employees) should be a priority process. It is advisable to use labor resources as sparingly as possible; recruitment or searching for new partners and freelancers is necessary only if training does not allow obtaining new competencies. Unfortunately, in the current practice of many companies, in cases where new

competencies are needed, they often turn to the labor market, “heating it up” and worsening the already difficult situation with personnel.

Training of specialists from partner organizations and freelancers should be included in the contractual obligations, but it can also take place in a joint format (when in-house staff and external specialists learn together). Not only the format but also the competency planning should consider the interests of both in-house and outsourced professionals, as well as the development goals of the organizations where outsourced professionals work. The approach based on workforce ecosystems implies partnership relations in the management of human intellectual capital. Human intellectual capital does not include all labor resources, but only those involved in the transformation of the company. Work ecosystems do not replace and do not fully include HR management systems; they are a tool for managing human IR, which combines the tacit knowledge of both full-time employees and all those involved in the organization.

4. Digital platforms for workforce ecosystems

Taking into account the fact that workforce ecosystems include the workforce of not only the organization itself but also partner organizations and various third-party individuals: freelancers, consultants, and sometimes even clients, it is possible to manage such ecosystems only with the use of information systems. And the most effective in this case will be platform solutions (Slavin et al., 2019). Digital platforms allow communicating different subjects of activity with different interfaces to the information system. The most well-known digital platforms are marketplaces, which provide communication between sellers of goods and services, buyers, couriers, etc. All users of marketplaces have their own interfaces to access the platform, depending on the tasks they solve. As a rule, individuals interact with the digital platform through a web interface or mobile application, while organizations integrate access to platforms with their information systems.

The diverse nature of access to digital platforms leads to an important requirement for their functionality—the need for easy integration with other systems. This requirement, along with the fact that platforms provide different access to their users, is an important feature of digital platforms as opposed to other enterprise information systems. However, there is another feature of digital platforms—the addition of value not directly related to communications. For marketplaces, such added value (for many users, it is very important) becomes customer ratings or reviews. Such value increases in the process of functioning of the digital platform and creates a real asset for the company-provider of the platform service, most often more valuable than the software created for the platform.

Ratings on digital platforms can be different. While in conventional marketplaces it is the usual rating of goods and services, in digital cab aggregators, for example, all participants in trips, both cab drivers and passengers, are rated. In social networks, whose services are free for most users, the added value is user data that allows advertisers to target their offers. In the case of workforce ecosystems, such value can be the labor and educational trajectories of users, which will allow for more efficient

use of the labor of certain specialists, consider their individual characteristics, and more accurately determine the experience and potential capabilities of a person.

The digital platform of the workforce ecosystem should be integrated into the information systems of the enterprise and allow external users of partner organizations to work with it. **Figure 2** shows the functional scheme of interaction of the digital platform of the workforce ecosystem with other information systems (the dotted line indicates the boundaries of the information systems of the organization and partners). The digital platform integrates with the HR (human resources) systems of all participants, thus forming a register of all specialists who make up the human resources of the organization. The digital platform also receives information from time tracking systems (TT) of employees of all partner organizations, including freelancers. Thus, the digital platform of the workforce ecosystem allows monitoring of all labor activities related to innovation and the development of the organization.

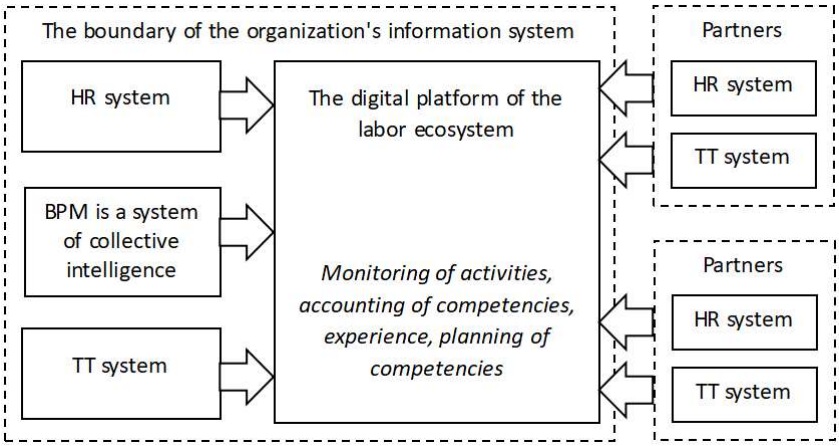

Figure 2. Functional scheme of the digital platform of the workforce ecosystem.

An important condition for the effective use of human IR in innovative activities is the organization of business processes (business process management—BPM) with the use of collective intelligence technologies (Slavin, 2022). The solution to digital transformation tasks is possible only with the organization of group work, which considers both the professional competencies of participants and their ability for creative or analytical activity. Correct association of specialists into groups (for example, scrum teams), involvement of external consultants, tutors, and visionaries at different stages of project implementation, allows to increase the productivity of creative labor activity many times, and also gives the opportunity to get feedback for planning the development of competencies, both through training and through recruitment and the search for new partners.

Capterra.com, part of Gartner's digital markets family of global digital market research sites, lists more than a thousand digital workforce automation solutions. However, the use of a platform approach in these solutions is extremely rare (no more than ten solutions as of mid-2023), and even these solutions are very limited in functionality (platforms are typically used for distributed labor). In most cases, enterprises must develop relevant solutions in-house to manage workforce ecosystems. This suggests that the market for digital platforms for workforce ecosystems is still in its infancy.

5. Conclusions

The digital age, which is accelerating competition in the technological sphere, requires new approaches to labor management. Many partners, consultants, and freelancers are involved in the transformation of organizations' activities due to the introduction of new technologies. For all professionals, both internal and external, to interact effectively, it is necessary to develop and implement workforce ecosystems. In 2023, the Dutch Academy to Innovate HR AIHR (Academy to Innovate HR AIHR) mentioned managing workforce ecosystems among the main HR trends.

However, workforce ecosystem management does not replace HR management systems; it should be focused on those professionals (both inside and outside the company) who are involved in transforming the company, implementing new technologies, optimizing processes, etc. In fact, workforce ecosystem management systems are the tacit knowledge management systems required for organizational development. Today, there are still few examples of the development and implementation of workforce ecosystem management systems, but soon most enterprise software vendors will surely offer their solutions in this area. And most likely, these solutions will be in the form of digital platforms that are designed to address ecosystem challenges.

Conflict of interest: The author declares no conflict of interest.

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