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OPTIMIZATION CHALLENGES OF RESOURCES IN IT OUTSOURCING COMPANIES IN UNCERTAIN MARKET CONDITIONS

Abstract. *In the modern world, IT outsourcing is becoming widely popular, offering companies the opportunity to focus on core competencies and effectively reduce costs. However, with the increasing use of outsourcing, new challenges arise, particularly in the context of unstable market conditions. Changes in the technological landscape, unpredictability of client requirements, and market fluctuations pose challenges for resource management in outsourcing projects. The lack of a balanced resource management strategy leads to the loss of competitive positions and decreased operational efficiency. This article aims to investigate the issues of resource allocation in IT outsourcing companies, focusing on their optimization and effective utilization. In the era of globalization and rapid technological progress, the importance of resource optimization has become a key task for technological companies. The article argues the necessity of developing new resource management methods in conditions of market instability and high uncertainty. The proposed methods will have the potential not only to optimize resources but also to provide competitive advantages in the face of turbulent market changes. The research is based on the analysis of current trends and practical experience, confirming the relevance of the chosen issue.*

Keywords: IT outsourcing; resource optimization; market uncertainty; resource management strategies; Ukraine IT market; artificial intelligence; digital transformation; crisis adaptation

Introduction

IT outsourcing is a highly specialized type of business sensitive to market fluctuations [1 – 3]. In modern conditions, IT outsourcing faces numerous challenges, including political and economic instability at the international level, rapid technological updates, and increased competitive activity. These circumstances can lead to contract reductions, revision of pricing policies, and higher service quality standards [4 – 6]. The global COVID-19 pandemic and geopolitical conflicts have added additional challenges to IT outsourcing, emphasizing the need for adaptation to new realities [7].

Outsourcing as a strategic partnership in the IT sector aims to optimize costs, increase productivity, and enhance task performance efficiency. However, growing market uncertainty complicates planning and resource management processes. The article is dedicated to the analysis of existing and the development of new methods that will solve the task of effectively optimizing resources of IT outsourcing companies in conditions of

market uncertainty and the possibility of assessing the implementation results of these methods in companies' future practices.

Research objective

The research objective is to enhance competitiveness, and operational efficiency, and ensure company stability in uncertain conditions through the development of resource optimization strategies and methods. To achieve the set goal, the article formulates the following tasks: to study and analyze the current state of the market, explore existing resource management methods and tools, and perform their comparative analysis.

Materials and methods

To achieve the research objectives, empirical methods were employed, encompassing the following stages:
– Data Collection: data related to the IT outsourcing market in Ukraine were gathered for the

study. This included statistical data, reports, research findings, and other information sources.

    – Data Analysis: the collected data were analyzed using statistical methods and data analysis tools to identify key trends and market characteristics.

    – Comparative Analysis: a comparative analysis of data from various sources was conducted to assess the current state of the market and identify similarities and differences.

The empirical methods utilized in this research allowed for an analysis of the IT outsourcing market in Ukraine and the identification of key trends and characteristics. However, it's important to consider that the research results may be constrained by the data and methods used within the study.

Results and discussion

The comprehensive analysis of the current landscape of IT outsourcing companies in Ukraine for the year 2023 sheds light on a multitude of discernible trends and accompanying challenges. Throughout the past half-decade, Ukraine has experienced a meteoric rise, solidifying its position as a leading hub for IT outsourcing within Central and Eastern Europe, as delineated in the report titled [8].

This ascent is not devoid of external and internal influences that exert significant sway over the IT outsourcing sphere in Ukraine. External forces wield substantial clout in shaping the trajectory of Ukraine's IT outsourcing market. Geopolitical circumstances, for instance, have left an indelible mark on Ukraine's IT outsourcing landscape, with reports underscoring the exportation of IT services to the tune of a staggering $6.8 billion annually, a figure tantamount to approximately 4% of the nation's GDP, as documented in [9]. Remarkably, despite facing a barrage from Russia at the close of 2022 and the inception of 2023, Ukraine's resilient infrastructure has enabled the IT sector to maintain its status as a stalwart economic pillar, a testament to the country's resilience as highlighted in [10].

The unanticipated surge in digitization, spurred by the global pandemic, has indubitably catalyzed an exponential growth in the contingent of IT specialists in the Ukrainian marketplace. The year 2023 witnessed Ukraine ascend to the coveted top spot among 169 countries in the prestigious Good Country Index, specifically in the realm of science and technology, as elucidated in [11]. An astonishing fact to note amidst these transformative times is that even in the face of a full-scale invasion, Ukraine stands resolute as a thriving technological epicenter. A remarkable statistic is that one-fifth of Fortune 500 companies have established remote development teams within Ukraine, while multinational technology behemoths such as Microsoft, Amazon, Google, and Eriksson have chosen to anchor their research and development centers in Ukraine, underscoring the nation's allure, as outlined in [12].

Nonetheless, the year 2023 has brought its own set of tribulations, marked by a 9.3% decline in IT services exports from Ukraine during the initial half of the year. This dip can be attributed to the confluence of war-induced disruptions and a global economic deceleration. Despite these headwinds, Ukraine's infrastructure remains steadfast, and the arena of artificial intelligence startups exhibits a discernibly positive trajectory, reaffirming the nation's resilience and unwavering commitment to technological advancement, as illustrated in [11].

Amid these challenges, the strategic pivot towards enhancing digital infrastructure and fostering innovation ecosystems has become paramount. This strategic shift not only aims to mitigate the impact of immediate market and geopolitical adversities but also sets the stage for long-term resilience and growth. The emphasis on digital infrastructure enhancement, coupled with support for innovation ecosystems, is expected to catalyze the development of new, robust technological solutions. Such initiatives are pivotal in reinforcing the IT sector's ability to adapt and thrive, ensuring that Ukraine not only navigates the current tumultuous landscape but also emerges as a stronger, more agile participant in the global IT outsourcing arena.

To comprehensively comprehend the dynamics of the IT outsourcing market in Ukraine, it becomes imperative to undertake a meticulous analysis of the associated risks and opportunities within the ever-evolving contexts of geopolitical transformations, economic oscillations, and global technological trends. These pivotal considerations are meticulously cataloged and expounded upon in the ensuing Table 1. During the timeframe spanning from January 2022 to July 2023, a notable and substantial decline has been witnessed in the contingent of IT specialists operating within the realm of IT outsourcing in Ukraine. During the timeframe spanning from January 2022 to July 2023, a notable and substantial decline has been witnessed in the contingent of IT specialists operating within the realm of IT outsourcing in Ukraine.

This decline is particularly conspicuous due to a significant portion of it being attributable to the relocation of specialists to foreign shores. In the initial half of 2023, a noteworthy reduction of 5%, equating to nearly 5000 individuals, in the number of specialists was recorded within the top 50 IT companies in Ukraine, as meticulously detailed in Table 2. This reduction translated to a total of 92.4 thousand employees compared to the 100 thousand counts at the outset of 2022, as corroborated by sources such as [13; 14].

*Table 1 – **Risk and Opportunity Analysis for Various Aspects
of the IT Outsourcing Market in Ukraine***

Aspect	Risk	Opportunity
Geopolitical Changes	Political instability and international conflicts can negatively impact the IT outsourcing market, creating barriers to international cooperation and investments.	New international agreements and partnerships can open new markets and increase opportunities for outsourcing companies.
Economic Cycles	Economic slowdown can lead to budget cuts for IT services, resulting in a reduction in outsourcing volumes.	Economic growth can increase demand for IT services and create new opportunities for expansion and innovation.
Global Technological Trends	Rapid technological advancements may require constant investments in training and development to remain competitive.	Innovative technological solutions, such as artificial intelligence, cloud technologies, and blockchain, can create new opportunities for delivering high-quality IT services and opening new markets.
Digital Transformation	Digitalization requires significant investments in new technologies and skills.	Digitalization creates new opportunities for the development of IT outsourcing.

*Table 2 – **Top 10 IT Outsourcing Companies by Negative Growth Dynamics in Ukraine***

Company Name	Soft Serve	EPAM Ukraine	GlobalLogic Ukraine	NIX	Ubisoft	DataArt	ELEKS	Playrix	Ciklum	Luxoft Ukraine
Hiring Dynamics for the First Half of 2023, Specialists	-1468	-1225	-444	-400	-348	-250	-215	-210	-203	-200

The rationale behind this decline in the number of specialists in Ukraine can be elucidated through two distinct yet interrelated factors. Firstly, a substantial portion of specialists embarked on a journey abroad, where they subsequently underwent legalization procedures, signifying that their relocation did not necessarily equate to a decrease in the overall number of specialists within the ambit of these companies on a global scale. This multifaceted perspective is elucidated in the sources [13; 14].

Secondly, the decrease in the number of IT specialists can be attributed to their mobilization into the ranks of the armed forces of Ukraine, a testament to their unwavering commitment to the nation's defense and security. It is crucial to underscore that even if specialists opted to relocate abroad and continued to fulfill their tax obligations within Ukraine, they remained included in the pertinent statistical data, as corroborated by the sources [11; 13].

An additional noteworthy facet to consider is the composition of the specialists who undertook relocation endeavors. Predominantly, it was the technical specialists who constituted the majority of those embarking on this transformative journey. This demographic shift resulted in a particularly substantial decrease in their numbers during the latter half of 2023, with a reduction of 4600 individuals, as elucidated in [23].

Nonetheless, it is crucial to acknowledge that amid the challenges, certain companies managed to maintain a positive trajectory. One noteworthy example is GR8 Tech, the successor company of Parimatch Tech, which exhibited remarkable resilience in the face of adversity. During the latter half of 2022, GR8 Tech made substantial strides by hiring an impressive cohort of 323 specialists, a testament to their commitment to growth and adaptability, as illuminated in the report [13].

In a similar vein, among the top 50 IT companies in Ukraine, a mere 14 entities witnessed an upswing in the number of specialists within their ranks during this challenging period. Such pockets of growth, albeit limited in number, serve as beacons of hope amidst the prevailing uncertainty, as elucidated in the report.

Furthermore, when focusing on the top five largest companies in the Ukrainian IT landscape, it becomes evident that only EVOPLAY managed to sustain positive dynamics. EVOPLAY's commendable feat involved an augmentation of their workforce by an impressive tally of 253 individuals during the last half-year, as documented in [14]. It is noteworthy, however, that the

companies demonstrating growth dynamics primarily belong to the product segment rather than the outsourcing sector.

Shifting our gaze towards the broader landscape of the IT outsourcing job market in Ukraine from the years 2020 to 2023, a myriad of significant transformations come to light. As of April 2023, an intriguing phenomenon was observed on the DOU platform - it marked the lowest number of vacancies in three years, registering a mere 3,226 openings. Notably, non-technical vacancies experienced a surge of over 50%, underscoring the evolving nature of job opportunities in the IT sphere. Conversely, most technical categories bore witness to a substantial decrease, surpassing the 50% mark in some cases. This paradigm shift extended its reach to encompass all major cities of Ukraine and even remote positions, as vividly illustrated in Figure 1. Simultaneously, the competition for these dwindling vacancies intensified, with an average of 28.5 responses per vacancy recorded in April 2023, an all-time high in terms of competition. The companies that exhibited the highest levels of activity in posting vacancies during this period included Genesis, Ajax Systems, and PIN-UP. BUSINESS, as corroborated by the report [15].

Fast-forwarding to early October, a comprehensive search on Djinni revealed a landscape characterized by 92.3 thousand candidates, marking a 5% increase compared to the previous quarter. However, in stark contrast, the number of vacancies dwindled significantly, dwindling by 25% when juxtaposed against the preceding quarter. This disparity was further exacerbated by a substantial surge in competition across all categories, with the competition index soaring from 9.15 to 13 over three months, signifying heightened competitiveness in the job market. Detailed insights into this transformation are visually represented in Figure 1, offering a comprehensive view of the evolving dynamics, as detailed in the report [16].
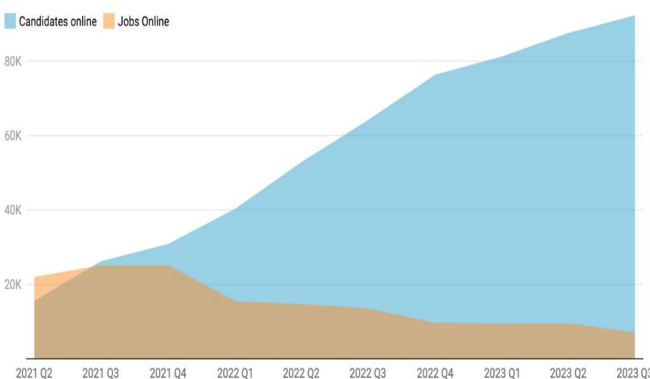

Figure 1 – Published Job Vacancies Compared to the Number of Available Specialists.

In the ever-evolving landscape of business, characterized by its inherent volatility and unpredictability, companies grapple with the formidable challenge of forecasting and resource planning. The dynamic nature of the market, coupled with the relentless pace of technological advancement, necessitates the utilization of specialized methods and tools to navigate these complexities effectively.

Within the realm of outsourcing IT services, resource management emerges as a linchpin for sustaining competitiveness and realizing strategic objectives. Recent years have witnessed the emergence of a plethora of tools designed to optimize resource utilization, fostering flexibility and adaptability in the face of a rapidly changing market environment. These tools encompass a diverse spectrum, including project management systems, business process modeling tools, portfolio project management systems, and solutions for business analytics and data intelligence.

Diverse in their approaches, companies adopt a range of methodologies and tools to tackle the formidable task of resource planning and management. Some organizations opt for specialized tools tailored to this purpose, exemplified by comprehensive project management systems like Jira or Microsoft Project. These systems facilitate granular task planning, progress tracking, and resource allocation while meticulously considering the project's real-time requirements. Moreover, these systems are often seamlessly integrated with ancillary tools such as time management, budgeting, analytics, and reporting, creating a cohesive ecosystem of resource management.

Conversely, there exist companies that embrace more traditional methods, finding solace in the familiar embrace of Microsoft Excel. Excel, with its time-tested capabilities, enables the creation of intricate resource allocation tables, facilitating the meticulous tracking of budgets and task execution. Despite its relatively lower degree of automation, Excel remains the cornerstone of flexibility and ease of use, attributes cherished by some organizations.

However, it is important to recognize that not all companies harness specialized resource management tools. Some entities rely on informal methodologies characterized by internal meetings, email correspondences, and documentation. This approach, while seemingly unconventional, proves efficacious for smaller projects or those with less intricate coordination and planning demands.

The significance of these resource management systems lies in their capacity to prioritize, allocate resources, and adapt to the evolving requirements of projects, particularly in conditions rife with uncertainty. On a different note, business process modeling tools such as Bizagi and ARIS provide an avenue for visualizing and analyzing intricate business processes, pinpointing inefficiencies, and identifying opportunities for optimization. These tools extend their purview beyond

processes themselves, delving into resource allocation and utilization, thereby promoting efficiency at multiple levels.

Turning our attention to portfolio project management tools such as Planview and Clarizen, they empower IT project managers to evaluate the potential impact of various initiatives on the organization's overarching strategy. Additionally, they streamline resource allocation, ensuring optimal utilization while facilitating the selection of projects that align harmoniously with long-term business objectives and strategic direction.

In the realm of business analytics and data intelligence, tools like Tableau and Power BI assume a pivotal role. They furnish the capability for in-depth data analysis, unveiling hidden trends, facilitating the forecasting of changes, and empowering informed decision-making regarding resource allocation. These tools imbue organizations with the ability to harness the power of data to steer their resource management strategies effectively.

Considering the foregoing, modern resource management tools wield considerable influence within the domain of outsourcing IT companies. They serve as linchpins in bolstering adaptability and responsiveness to the capricious winds of market conditions. These tools do not merely optimize the present utilization of resources but also extend their utility to strategic planning. By analyzing market trends and forecasting resource requirements, they empower organizations to chart a course toward a future defined by resilience and competitiveness. A comprehensive analysis of human resource management tools in the IT sector, as outlined in sources such as [17 – 20] is presented in Table 3.

In the context of the Ukrainian market, which is characterized by an exceptionally high level of uncertainty and dynamic changes, the existing resource management methods employed by outsourcing IT companies, as discussed in [21], often fall short of delivering the required effectiveness. This deficiency arises primarily because many of these methods were originally developed and optimized for more stable and predictable market conditions, neglecting the specificity and rapidity of changes witnessed in the Ukrainian business environment.

*Table 3 – **Analysis of Human Resource Management Tools in IT***

Tool	Advantages	Disadvantages	Growth Areas
Jira	Flexible Project Management, Efficient Task Tracking.	ChatGPT. Limited Big Data Analysis Capabilities.	Integration with External Data and Macroeconomic Indicators.
Microsoft Project	Detailed Project and Resource Planning.	Integration Complexity with Other Systems.	Flexibility in the Face of Sudden Market Changes.
Bizagi	Visualization of business processes, efficiency analysis.	Limited adaptability to rapid changes.	Risk modeling and strategic planning.
Anaplan	Flexible planning and modeling of business processes. Support for a wide range of business functions.	High complexity and the need for specialized knowledge for effective use.	Advanced capabilities for analyzing and managing risks beyond human resources.
Planview	Project management, resource optimization.	Limited responsiveness to external challenges.	Analysis of the impact of global events on projects.
SAP Success-Factor	Covers all aspects of personnel management, including recruitment, assessment, and development. Integrates well with other SAP products.	Requires significant resources for implementation and maintenance. Can be too complex for small and medium-sized companies.	Improvements in predictive analysis to adapt to changes in the workforce and market conditions.
Workday	Integrated HR solutions, effective talent, and finance management. Supports scalability and global operations.	High cost and complexity of implementation. May require additional customization for specific needs.	Increased adaptability to rapidly changing market conditions and flexibility in trend forecasting.

While tools such as project management systems and analytical platforms play pivotal roles in planning and analysis, they frequently fail to provide adequate responses to abrupt economic upheavals, political instability, or unforeseen crisis events that can potentially disrupt the Ukrainian landscape.

The challenge is multifaceted, extending beyond the limited functionality of existing tools to encompass the issue of integration among these tools. The prevailing focus of most tools remains centered on internal project and resource management, overlooking external factors like currency fluctuations, legislative changes, or socio-economic crises. These external variables have the potential to profoundly alter the business landscape. In a scenario where the Ukrainian market experiences tumultuous and unpredictable transformations, the necessity arises for tools capable of not only offering operational insights but also facilitating strategic analysis. Such tools enable companies to swiftly realign their strategies and resources in response to emerging realities.

Hence, there exists a conspicuous imperative for the development and implementation of novel resource management tools meticulously tailored to the idiosyncrasies of the Ukrainian market. These tools must exhibit flexibility, scalability, and seamless integration, allowing for the expeditious collection and analysis of extensive data sets. They should be adept at accommodating both internal and external changes, equipping IT companies with the resilience not just to survive but to flourish in an environment characterized by perpetual uncertainty. In essence, crises should be perceived as opportunities for innovation and growth.

Addressing the myriad challenges confronting outsourcing IT companies in Ukraine necessitates prioritizing the development of fresh resource management methods and tools. These methodologies should consider the distinct characteristics of the local market, characterized by its volatility and unpredictability. Innovative approaches should be underpinned by flexibility and adaptability, enabling companies to respond promptly to fluctuations in economic and political contexts. This entails the creation of tools proficient in aggregating diverse data sources, encompassing macroeconomic indicators, market trends, and internal performance metrics. These tools facilitate comprehensive analysis and forecasting, thereby enhancing decision-making capabilities.

The development of such advanced tools mandates the incorporation of cutting-edge technologies such as artificial intelligence and machine learning. These technologies can discern patterns and identify potential risks within vast datasets. Additionally, it necessitates the formulation of adaptive management models that can be customized to cater to the unique needs of each company and its individual projects. An equally crucial aspect is the creation of user-friendly interfaces that empower project managers to intuitively interpret analytical data and make informed decisions. These pioneering methodologies and tools will assume a pivotal role in ensuring the resilience and competitiveness of Ukrainian IT outsourcing companies within the global market, firmly positioning them to navigate the uncertainties of the business landscape.

Conclusions

The global landscape of IT outsourcing is rapidly expanding, offering companies the enticing prospect of focusing on their core competencies while simultaneously achieving substantial cost reductions. This trend is particularly conspicuous in the technology sector, where outsourcing IT functions can yield significant efficiency gains and substantial savings. Nonetheless, the escalating dependence on outsourcing introduces a fresh set of challenges, particularly in unstable market conditions and the rapid evolution of technology. These challenges necessitate a comprehensive reevaluation of existing practices and the cultivation of more resilient and adaptable strategies.

While current tools and Project Resource Planning (PRP) systems have proven effective to a certain degree, they ultimately fall short of fully addressing the multifaceted complexities and dynamic nature of the modern outsourcing landscape. This inherent gap underscores the urgent requirement for innovative solutions, with a specific emphasis on harnessing the capabilities of artificial intelligence (AI). AI's unparalleled capacity to process vast volumes of data, identify intricate patterns, and predict emerging trends renders it an invaluable asset in navigating the multifarious uncertainties permeating the outsourcing market.

The ascendancy of Ukraine as a prominent hub for IT outsourcing is a noteworthy development, propelled by its abundant reservoir of skilled IT professionals and competitive cost structures. Nevertheless, the country's unique geopolitical and economic landscape presents distinct challenges. Companies operating in Ukraine must adapt to these conditions by cultivating innovative resource management methods. The seamless integration of artificial intelligence and machine learning into these methods assumes paramount significance, as it is instrumental in sustaining competitiveness and operational efficiency in an environment characterized by capricious unpredictability.

The evolving nature of the IT outsourcing market underscores the pivotal role of adaptability and strategic planning. Companies must exhibit agile responsiveness to rapid market shifts and technological advancements, particularly in a dynamic and uncertain market milieu analogous to Ukraine's, where external factors can exert a profound impact on business operations.

Looking forward, the focal point will shift towards an exhaustive analysis of potential AI tools that can be judiciously harnessed to address these multifaceted challenges. This scrutiny will encompass a comprehensive exploration of diverse AI-driven solutions, their applicability within the domain of IT outsourcing, and their potential to augment decision-making processes, optimize resource allocation, and prognosticate market trends. The overarching objective is to pinpoint AI tools that not only streamline operational processes but also furnish strategic insights, thereby empowering companies to adeptly navigate the labyrinthine complexities inherent in the outsourcing market, fortified with heightened confidence and foresight.

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ПРОБЛЕМИ ОПТИМІЗАЦІЇ РЕСУРСІВ АУТСОРСИНГОВИХ ІТ-КОМПАНІЙ В УМОВАХ НЕВИЗНАЧЕНОСТІ РИНКУ

Анотація. У сучасному світі ІТ-аутсорсинг набуває широкого розповсюдження, надаючи можливість компаніям концентруватися на основних компетенціях і ефективно зменшувати витрати. Проте зі зростанням застосування аутсорсингу виникають нові виклики, зокрема в контексті нестабільних ринкових умов. Зміни в технологічному ландшафті, непередбачуваність вимог замовників та коливання ринку стають викликами для управління ресурсами в аутсорсингових проєктах. Відсутність виваженої стратегії управління ресурсами призводить до втрати як конкурентних позицій, так і зниження ефективності операційної діяльності компанії. Ця стаття спрямована на дослідження проблем розподілу ресурсів в аутсорсингових ІТ-компаніях, акцентуючи увагу на питанні саме їх оптимізації та ефективного використання. В умовах глобалізації і стрімкого технологічного прогресу важливість оптимізації ресурсів стає ключовим завданням технологічних компаній. Стаття доводить необхідність розроблення нових методів управління ресурсами в умовах ринкової нестабільності та високої невизначеності. Запропоновані методи матимуть потенціал не лише для оптимізації ресурсів, а й для забезпечення конкурентних переваг в умовах бурхливих змін ринкової кон'юнктури. Дослідження ґрунтується на аналізі сучасних тенденцій і практичному досвіді, що підтверджує актуальність вибраної проблематики.

Ключові слова: ІТ-аутсорсинг; оптимізація ресурсів; невизначеність ринку; стратегії управління ресурсами; український ІТ-ринок; штучний інтелект; цифрова трансформація; кризова адаптація

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