

# Unlocking Egypt's Global Software Development Potential: Analyzing Critical Success Factors, Obstacles, and Strategies

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## إطلاق إمكانات مصر في تطوير البرمجيات العالمية: تحليل عوامل النجاح الحاسمة والعقبات والاستراتيجيات

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## **Unlocking Egypt's Global Software Development Potential: Analyzing Critical Success Factors, Obstacles, and Strategies**

### **Abstract**

This study addresses the unrealized potential of the Egyptian ICT industry in the Global Software Development (GSD) market, which has witnessed significant growth, particularly accelerated by the COVID-19 pandemic's shift toward remote collaboration. Despite this opportunity, Egypt has struggled to capitalize on it. The research aims at identifying obstacles hindering Egyptian software exporters from maximizing their GSD market share and proposes strategies to enhance their activities. Key findings from the study prioritize critical success factors (CSFs) for GSD market share, with the top factors being product quality and a track record of successful projects. Recommendations include encouraging the merger of small companies to form larger-scale GSD providers, providing infrastructure support, and establishing local laws to protect offshore companies. Companies are advised to focus on quality, build a successful track record, and foster strong client relationships through expert management and dedicated roles. These insights and recommendations offer valuable guidance for enhancing Egypt's position in the GSD market. For future research, it is suggested to continue research into the tools and procedures required to raise the quality of locally developed software and to create a record of successful projects for software exporters and the facilities that the government can provide to encourage the integration of small companies, provide the necessary support for infrastructure, and establish local laws that protect companies operating abroad.

**Keywords:** Global Software Development (GSD), ICT industry, Critical Success Factors (CSFs), Egyptian exports, international market

Introduction

Today's common trend is to outsource IT offshore services from the global market. There is an elevated level of international competition in the global market regarding offshore IT services. GSD is a part of this global market. Developed countries outsource applications, web, mobile, and other types of software development from developing countries. Even highly developed countries like the USA and Canada contract companies or individuals in developing countries for software development tasks.

GSD benefits both sides. For example, developed countries can hire highly skilled developers to develop high-quality software at lower cost. On the other hand, underdeveloped countries make software exports; hence, they support their economies and increase their GDP (Sahay et al., 2003).

By comparing some well-performing countries in the domain of software export our region, one can see that these countries have stood out, showing much higher ICT service exports than Egypt. Table 1 shows the total ICT service exports as a ratio of the total service exports of some countries (sorted descending): Israel, India, Kuwait, Mali, Cyprus, and Egypt; see appendix (A) (The World Bank, 2025).

Table 1  
ICT service exports (% of service exports, Balance of Payments (BoP))

Country	Year	ICT service exports (% of service exports, BoP)
Israel	2023	59.7
India	2023	48.2
Kuwait	2023	45.8
Mali	2022	39.2
Cyprus	2023	31.8
Egypt	2023	4.3

Source: The World Bank, 2025.

According to the data above, it is clearly evident that Egypt deserves a better position in the global ICT export market. Therefore, a persistent need exists to explore solutions and develop frameworks to support Egyptian companies in enhancing Egypt's position in the GSD market. Very few researchers have tackled how to enhance Egypt's position in the global ICT export market. This study aims to help Egyptian ICT in software development companies maximize their share in the GSD market by studying the critical factors affecting the total amount of GSD exports and trying to find ways to improve these factors. The objective is to try to answer the following research questions:

- What are the GSD market's major Critical Success Factors (CSFs)?
- For the Egyptian companies, which CSFs need enhancement?
- How can Egyptian companies enhance their CSFs to GSD?

This research's significance lies in identifying how to support the Egyptian GSD companies in increasing their software exports to the external world. Exports are a critical factor for the economy, and increasing the exports of IT services is reflected effectively in the Egyptian Gross Domestic

Product (GDP). On the other hand, expansion in IT services exports increases the demand for IT professionals, which creates new jobs, helping to resolve the unemployment problem.

### Research Approach

The steps in the research include figuring out where Egyptian exporters stand in the GSD market, listing the key success factors (CSFs) that make up that position, and then ranking these CSFs from a domestic point of view. Finally, it attempts to suggest ways to improve them in the context of Egypt. This study follows a mixed methods approach: a quantitative study using a questionnaire and a qualitative study using several interviews. This approach has been chosen because some aspects are qualitative, such as the culture and language differences, and others can be measured with numbers, such as the Net Promoter Score (NPS) awarded to Critical Success Factors (CSFs) by companies participating in the questionnaire.

The research study consists of three stages, each addressing one research question. We design the first stage to extract the critical success factors of the GSD market through a literature review. The second stage is designed to prioritize the extracted CSFs from the Egyptian company's perspective, and this is done using a questionnaire. The third stage aims to figure out how to enhance these CSFs and is done using interviews.

### Identifying Critical Success Factors (CSFs) in the GSD Market

Keele University in the UK did an empirical study called "Critical Success Factors for Offshore Software Development Outsourcing Vendors." They discovered that many critical success factors affect an offshore software development company's share in the GSD market (Siffat et al., 2010).

Questioning Needs (Ali et al., 2019), Frequent and Proper Negotiations (Yaseen et al., 2020), and Prioritizing Management Success Factors in Offshore Software Development (Akbar et al., 2020) are some other CSFs that have been found.

Siffat developed the issued list below as representing the most important critical success factors to the GSD market:

- Cost saving, hence the prices a provider offers to its clients.
- The availability of skilled staff and certified developers in the provider's company.
- The size and quality of the IT infrastructure and the availability of sufficient hardware and software resources to execute large development projects.
- The quality of the software products and services a provider delivers.
- How efficiently the provider manages its relations with its clients.
- Provider's track record of successful projects.
- How efficiently the provider manages its projects and contracts.
- The availability of Service and Process Improvement (SPI) Certifications such as CMMI (Capability Maturity Model Integrated) and ISO in the provider's company.
- The level of experience and knowledge the provider has about his client's language and culture.
- The ability of the provider to deliver projects and products on time and its responsiveness to the client.
- The ability and frequency of the provider to conduct effective communication and proper negotiation with his clients.
- The ability of the provider to conduct proper requirements elicitation (gathering) and write a clear Software Requirement Specification (SRS) paper (Ali et al., 2019).
- The availability of the provider's overseas offices.

Following are descriptions of the CSFs listed above:

### ***Cost saving and pricing***

Cost is an important selection criterion when it comes to outsourcing software development. To take advantage of the low-cost labor, high-income countries outsource software development projects to countries with lower incomes, where staff costs are comparatively low (Siffat et al., 2010).

### ***Skilled human resource***

Skilled staff are particularly important to the information technology industry. Software development companies should hire highly qualified staff with computer science, engineering, management, and SPI certifications. Usually, a client is interested in the technical capabilities of the software provider (Siffat et al., 2010).

### ***Appropriate infrastructure***

Before undertaking outsourcing activity, clients should check the IT resources of the provider organization to succeed in outsourcing projects. This includes the number of servers, the intranet structure, and the performance of the system's resources. Good infrastructure includes:

- IT, network, and telecommunication infrastructure.
- Telecom, power/electric supply, roads, transportation, physical buildings, office layouts, and Internet access are the physical infrastructure of the vendor country and company.
- Sufficient hardware and software resources to maintain large development projects (Siffat et al., 2010).

### ***Quality of products and services***

To verify if the initial expectations match the result, appropriate quality characteristics and measures must be defined. The standard ISO/IEC 25000:201424, also known as SQuaRE (Software Product Quality Requirements and Evaluation), is defined by ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) (ISO, 2011). Software quality is a structured set of characteristics classified by the Quality Model Division as follows:

- **Functional Suitability:** This characteristic represents the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions.
- **Performance efficiency:** This characteristic represents the performance relative to the number of resources used under stated conditions.
- **Compatibility:** The degree to which a product, system, or component can exchange information with other products, systems, or components and/or perform its required functions while sharing the same hardware or software environment.
- **Usability:** The degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.
- **Reliability:** The degree to which a system, product, or component performs specified functions correctly under specified conditions for a specified period.
- **Security:** The degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access limited only to their types and levels of authorization.
- **Maintainability:** This characteristic represents the degree of effectiveness and efficiency with which a product or system can be modified to improve, correct, or adapt to changes in the environment and requirements.

- **Portability:** The degree of effectiveness and efficiency with which a system, product, or component can be transferred from one hardware, software, or other operational or usage environment to another.

### ***Efficient outsourcing relationship management***

Empathy, transparency, and "information & knowledge sharing" can build trust in multicultural environment project management, such as international projects. In intercultural communication, high-quality interaction significantly and positively influences the quality of the output. Multicultural project teams should be built on a foundation of transparency. Transparency should be maintained in terms of responsibilities, rewards, terms, and conditions (Yu et al., 2021).

### ***Organization's track record of successful projects***

In the opinion of intermediate-level experts, a solid list of the organization's track record of successful projects is a critical key factor (Siffat et al., 2010).

### ***How efficiently the organization manages its projects and contracts***

Because of the new challenges, such as misunderstanding the project's requirements, cost, effort estimation, risk management, task allocation, and lack of coordination, managing the GSD project is expected to be far more complex and difficult. The most commonly mentioned success factors in GSD projects are management organizational structure, project managers' skills, communication, and collaboration. Cultural awareness, requirement specification, roles and responsibilities, team commitment and structure, training, and trust building are all considered significant factors (Niazi et al., 2016).

### ***Software Process Improvement (SPI) certification***

To improve activities such as increasing development speed, achieving higher product quality, or reducing costs, SPI methodology is a mixture of tasks, tools, and techniques used to achieve it. Moreover, to detect inefficiencies in the software development life cycle (SDLC) and resolve them, the SPI methodology is used mostly in the case of process reengineering or change management (Samy, 2018).

### ***Knowledge of the client's language and culture***

Effective communication is necessary in GSD, especially in requirement elicitation activities. Developers and analysts from different national and organizational cultures cooperate in developing software. Global software development makes the collaboration among the team members who are working on the same project at different physical sites more complicated. Communication among the teams working on a project significantly affects the project's success. During the requirement-gathering and other phases, the English language should be used for communication by stakeholders for better understanding, as GSD projects deal with people with different mother tongues. Because some words may have different meanings, ontology plays a vital role in understanding and sharing common vocabulary. Global software development involves collaboration among global virtual teams, each with its own national culture and ethics. Accordingly, this affects the teams, the data, and the information they share about the projects that will be built (Malik et al., 2018).

### ***Timely delivery of the product***

Product delivery by deadlines and pre-scheduled project milestones is a critical success factor in global software development (Siffat et al., 2010).



### ***Frequent and proper negotiations***

Due to challenges such as geographical distance, language barriers, time zone differences, and culture variations, GSD is a challenging process for software providers. The complexity of requirements elicitation and implementation in GSD affects the final product quality and the project's success. Attention should be given to the significance of proper and effective negotiations. More and more collaboration among clients and vendors is needed to reduce the adverse effect of cultural variation and, of course, to make it easy to understand each other, as this leads to a compromise between both clients and vendors who create dependencies between each other (Yaseen et al., 2020).

### ***Requirements elicitation***

Requirement elicitation is considered a critical factor in GSD because its output is the Software Requirement Specification (SRS) document. All software development activities and professionals, including system analysts, coders, and testers, do their jobs based on the SRS document. Requirement elicitation depends on the quality and effectiveness of communications between the client and the vendor (Yaseen et al., 2022).

### ***The availability of the organization's overseas offices***

The availability of the organization's overseas offices is considered a critical success factor for global software development (Siffat et al., 2010), which makes sense because it facilitates communication between the company and its clients, eliciting requirements, and delivering final products.

## **Prioritization of CSFs in the Egyptian Context**

### ***Design of the questionnaire***

In the second stage of the research, the aforementioned critical CSF extracted from the literature review was used to design a questionnaire. The purpose was to identify their relative importance for companies operating in Egypt. The responder had to give a comparative weight to each factor within the range from 1 to 10, where 1 means that this factor has the least effect on the total volume of exports of software and 10 means that this factor has the most effect on the total volume of exports of software, (see appendix B, Table 1).

Net Promoter Score (NPS) techniques (Fisher & Kordupleski, 2019) were used to calculate the weight of a given factor (Appendix C).

### ***Participants sample selection***

The research participants are key stakeholders and subject matter experts in the domestic GSD domain. The study aims to collect data from a targeted sample of 30 companies across three levels: start-ups, small and medium-sized enterprises (SMEs), and corporate employees. The sample is selected using the quota sampling technique.

To achieve the target sample size, the study utilizes two primary data sources: The Information Technology Industry Development Agency (ITIDA) and a comprehensive database of ICT companies, as well as the Nilepreneurs Initiative hosted at Nile University. The advanced search function on ITIDA's website was used to refine the ICT company's database, selecting the category "International Applications/Products Services." The search was further narrowed by focusing on the sub-categories "Application and Products Development" and "Web Portals and Web Development Services," along with the sub-category "International Application Package Implementation and

Integration" under the "Solutions and System Integration" category. The search resulted in over a thousand companies. The study then contacted these companies by email and phone calls. The study also contacted all the companies provided by Nile University's incubators and accelerators and companies participating in SME support programs by both email and telephone. Despite the low response rate, we received a total of 31 valid responses.

Selection criteria of the participants:

- The participant should be involved in a business directive role.
- One of the objectives of the GSD company that the participant represents should be software export.

### **Data analysis**

Based on the data collected, the study deduced which critical success factors most affect the total amount of GSD exported by the sample companies. The Net Promoter Score (NPS) model is used to analyze the data collected through the questionnaire. The highest scores determine the ranking of CSFs. This provides a clear understanding of the significance of each CSF to the domestic GSD exporters. Table 2 divides the scores into four ranges, each represented by a rank, and assigns a rank to CSFs falling within that range. For example, all CSFs with scores in the range from 40 to 50 points are of rank 2. The ranking resulting from the questionnaire analysis is considered during the design of the interviews in the third step of this research study.

**Table 2**

*Priority ranking according to NPS indicator*

Range of NPS	Priority
> 50	1
40: 50	2
20: 30	3
< 20	4

**Source:** Compiled and calculated by the researcher.

Table 3 shows prioritized CSFs to the GSD domestic exporters according to the gained score of the NPS indicator. Table 3 also shows the priority of each factor according to the classification shown in Table 2. For more details about NPS score calculations, refer to Appendix (C).

**Table 3**

*Prioritized CSFs to GSD using NPS indicator*

CSF	NPS	Range	Priority
The quality of the software products your company delivers	64.5	> 50	1
The availability of your company's track record of successful projects	54.8		
How efficient your company manages its relations with its clients	48.4	40:50	2
The ability of your company to deliver projects and products on time and its responsiveness to the client	48.4		



How efficiently your company manages its projects and contracts	45.2		
The availability of skilled staff and certified developers in your company	41.9		
The level of experience and knowledge your company has about the client's language and culture	35.5	20: 40	3
The ability of the organization to conduct proper requirements elicitation (gathering) and writing a clear Software Requirement Specification (SRS) paper	32.3		
The ability and frequency of your company to conduct proper negotiations with its clients	25.8		
The size and quality of the IT infrastructure and the availability of sufficient hardware and software resources to maintain large development projects	12.9	< 20	4
Cost saving, hence, the prices your company offers to its clients	3.2		
The availability of your company's overseas offices	-29.0		
The availability of Service and Process Improvement (SPI) Certifications such as CMMI and ISO in your company	-51.6		

**Source:** Compiled and calculated by the researcher.

As shown in Table 3, the first level represents the NPS scores above 50, and it includes two factors: the quality of the software product and the availability of a track record of successful projects. The second level represents the range of NPS scores between 40 and 50, and it includes four factors: customer relation management, timely delivery & responsiveness, project and contract management, and the availability of skilled staff and certified developers. The third level represents the range of NPS scores between 20 and 40, and it includes three factors: knowledge about the client's language and culture, proper requirements elicitation, and proper negotiations with clients. The fourth level represents the NPS scores below 20, including four factors: IT infrastructure, pricing, overseas offices, and SPI certification.

## The Road to CSF Adoption

Interviews were conducted to determine how to enhance the critical success factors of the GSD market regarding Egyptian companies. The interviews are semi-structured, and the questions are prepared based on the results of the questionnaire. Extra questions emerged during the discussion. The study conducted three interviews. The following insights summarize the interviews.

### Scaling Up

The biggest challenge Egyptian GSD companies face is the scale. GSD customers require a huge workforce in one place, usually from 500 to 1000 developers, which is not typically the case in Egypt. There should be initiatives from business support organizations and industry associations to provide the facilities that enable investors to build such big sites at low cost. As investors always prefer OPEX over CAPEX and seek to shorten the time to market, such facilities should be provided with everything needed: the best internet speed, data centers, backup locations, and fiber optic connectivity, and they should be offered to investors with affordable rent and tax exemption for some years. There could also be initiatives to consolidate many small companies into one or a few bigger companies.

A policy recommendation to the government is to provide the means by which a dispute between the parties to the contract can be resolved and to enable the side of the contract that fulfilled its end to file a suit against the other side that did not. This way, the government can ease investors' fears and encourage them to get into the business.

### ***Developing Experience***

A software development company should go through some phases until it reaches the maturity level that qualifies it to compete in the global market. Initially, there should be at least 5+ years of experience with the local SMEs before approaching international clients. This graduation of approaching the global market builds the minimum requirements for competing internationally. Moreover, as the contracting cycle of the enterprise client is comparatively longer, software companies willing to compete locally should secure the cash flow to survive and cover salaries for one year and to cover other operating expenditures for at least the next 6 months. Additionally, software companies should hone their calibers' skills with respect to marketing, project management, sales, HR, technical, etc., so that they would be qualified enough to target global customers.

### ***Built-in Quality***

The quality of the software delivered can be enhanced by many ways. One of them is the retention of expert employees, as they have the knowledge that enables them to do things right and avoid common mistakes. Another one is testing; any software goes through what is called a User Acceptance Test (UAT) upon delivery to the customer so the company can do these tests in advance to ensure that everything is all right and that there are no bugs. Whether it will be performed in-house or outsourced, the cost of this testing process should be considered in the project cost. Also, quality can be enhanced by initially having a strong and proven quality approach/methodology/procedure and by being willing to adapt standards and modus operandi.

### ***Customer Centricity***

For a company to create positive relations with its customers, its main objective should be delivering value to the customer rather than merely making money from him. Also, it can be enhanced by assigning an Outsourcing Manager/Customer Success Manager with proven experience in the execution of outsourcing, which only makes sense if the customer company assigns a Demand Manager. These two peers will determine the quality of work and the relationship.

To enhance the availability of a company's track record of successful projects, the company can fund from the marketing budget and land on tenders with big brands at the cost or even below the project cost; hence, it can build a track record of successful projects.

An expert function/employee should manage projects and write contracts, and it is preferred that a dedicated project manager be assigned to each project. Standardization is a strong medium for arranging proper adjustments and communication between both contract sides.

### ***Solid HR Functions***

The availability of skilled staff and certified developers can be enhanced by having a solid HR function that knows how to deal with career development, training & education, and corporate social responsibility towards staff and the social environment. In addition to offering competitive salaries, these factors contribute to the company's attractiveness to candidates.

## Conclusion

The study tried to answer three questions about the most important Critical Success Factors (CSFs) in the GSD market, the CSFs that Egyptian companies should pay more attention to, and the best way for Egyptian companies to deal with these issues. The first question was approached through a comprehensive literature review, which yielded results that were then used as input for a questionnaire to answer the second question, while the third of the research questions was answered through interviews.

The top priority factors are the company's track record of successful projects and the quality of the delivered product. It was followed by another group with less priority, like how efficiently your company manages its relations with its clients, the ability of your company to deliver projects and products on time and its responsiveness to the client, how efficiently your company manages its projects and contracts, and the availability of skilled staff and certified developers in your company.

It was also found that the retention of expert employees and calibers, solid testing activities, and quality methodology with standard modus operandi are the means by which a provider can enhance the quality of its deliverables. In the meantime, companies can build a track record of successful projects by allocating funds from their marketing budget to contract at cost or even below it.

For a software provider to be able to compete in the global market, it should work first for the domestic market to build the experience, solid functions, and revenue stream required for successful competition in the global market. However, to succeed in the global software development market, GSD providers need to operate on a large scale. Hence, business support organizations (BSOs) and industry associations should provide initiatives and facilities to merge and scale up domestic companies. The role of business support organizations and industry associations can be considered the most affecting factor in the total volume of software exports.

## Recommendations

The following recommendations need to be followed to enhance the position of Egyptian GSD companies in the GSD market.

### *Recommendations for Business Support Organizations and Regulators*

The global software development market requires GSD providers with large sizes, estimated from 500 to 1000 developers, in one site. So, small domestic offshore companies should seek to merge to form larger-scale companies more capable of competing in the GSD market. The scale of companies that consist of a few developers does not allow for applying firm quality assurance practices, so the scale is required for applying recommended best practice processes. Accordingly, more studies are needed to cover the methodologies, tools, and plans required to merge small GSD companies into bigger ones.

Meanwhile, businesspeople and entrepreneurs should be facilitated and encouraged to establish big GSD sites. The cost of establishing big GSD sites is high; hence, business support organizations and industry associations should provide site facilities with a capacity of 500 to 1000 developers with all the needed IT infrastructure, including data centers, high-speed internet, fiber connections, etc. Businesses should provide these facilities at reasonable rental rates.

From a regulatory perspective, the availability of local laws and regulations to protect the offshore companies in case of disputes by facilitating the process of filing a complaint and filing a lawsuit

against a foreign client in case the local provider fulfilled his end but the foreign client side did not. More studies are needed to cover these laws and the tools required to put them into effect. Finally, there should be a tax exemption for a specific period for local companies that export software to encourage establishing more software providers.

### ***Recommendations for Companies***

The following points sum up the recommendations for companies:

- The most important critical success factors a local software exporter should focus on are the quality of deliverables and building a proven track record of successful projects.
- For a software provider to compete in the global market, companies should concentrate on building experience, solid functions, and a revenue stream in the domestic market first.
- Retaining expert employees and calibers, solid testing activities, and quality methodology with a standard modus operandi are ways for a provider to enhance the quality of his deliverables.
- There should be an expert function/employee for managing projects and writing contracts, and it is preferred that there be a dedicated project manager for each project.
- For a company to create positive relations with its customers, its main objective should be delivering value to the customer rather than merely making money from him.

### **Research limitations**

Only a handful of researchers have addressed the issue of boosting Egyptian companies' market share in the Global Software Market (GSD). The questionnaire's response rate was only 10% of the invited persons who took the survey in response to the invitation. The study relies on the cooperation of entrepreneurs and field experts to conduct interviews, as most of them are too busy to find the time for them. The study is conducted in the context of Egypt, which shares many characteristics with other developing countries, but its situation might not be completely generalizable to all similar countries.

This research showed the important role that the government can play in supporting Egyptian ICT companies in maximizing their share in the Global Software Market (GSD). Future research should focus on the tools, procedures, facilities, and laws that the government can provide to help Egyptian ICT companies achieve their goals.

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## References

- Akbar, M., Mahmood, S., Khan, A., AlSanad, A., & Gumaei, A. (2020). Prioritizing management success factors in offshore software development. *Arabian Journal for Science and Engineering*, 45(12), 10163–10184. <https://doi.org/10.1007/s13369-020-04607-2>
- Ali, Z., Yaseen, M., & Ahmed, S. (2019). Effective communication as critical success factor during requirement elicitation in global software development. *International Journal of Computer Science Engineering (IJCSE)*, 8(03), 108–115.
- Fisher, N., & Kordupleski, R. (2019). Good and bad market research: A critical review of Net Promoter Score. *Applied Stochastic Models in Business and Industry*, 35(1), 138–151.
- International Organization for Standardization. (2011). Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models (ISO Standard No.: ISO 25010:2011). <https://www.iso.org/standard/35733.html>
- Malik, B., Faroom, S., Ali, M., Shehzad, N., Yousaf, S., & Saleem, H. (2018). Geographical distance and communication challenges in global software development: A review. *International Journal of Advanced Computer Science and Applications*, 9(5), 406–414. <https://doi.org/10.14569/IJACSA.2018.090553>
- Niazi, M., Mahmood, S., Alshayeb, M., Qureshi, A., Faisal, K., & Cerpa, N. (2016). Toward successful project management in global software development. *International Journal of Project Management*, 34(8), 1553–1567. <https://doi.org/10.1016/j.ijproman.2016.08.008>
- Sahay, S., Nicholson, B., & Krishna, S. (2003). Global IT outsourcing. *Global IT Outsourcing*, May 2015. <https://doi.org/10.1017/cbo9780511615351>
- Sami, M. (2018). Software process improvement (SPI)—Reward or risk. Retrieved January 26, 2021, from <https://melsatar.blog/2018/06/26/the-software-process-improvement-spi-reward-or-risk>
- Siffat, U., Mahmood, N., & Ahmad, R. (2010). Critical success factors for offshore software development outsourcing vendors: An empirical study. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 6156 LNCS, 146–160. [https://doi.org/10.1007/978-3-642-13792-1\\_13](https://doi.org/10.1007/978-3-642-13792-1_13)
- The World Bank. (2022). High-technology exports (current US\$) | Data. <https://data.worldbank.org/indicator/TX.VAL.TECH.CD>
- Yaseen, M., Ali, S., Mustapha, A., & Mazhar, N. (2022). Success factors analysis for requirement elicitation in global software development paradigm: An empirical study. *Journal of Software: Evolution and Process*, 34(7), 1–32. <https://doi.org/10.1002/smr.2460>
- Yaseen, M., Kamal, S., Bacha, M., Khan, A., & Zaman, S. (2020). Frequent and proper negotiations as success factor in global software development. *International Journal of Computer Science Engineering (IJCSE)*, 9(4), 281–288.
- Yu, W., Cormican, K., Wu, Q., & Sampaio, S. (2021). In whom do we trust? Critical success factors impacting intercultural communication in multicultural project teams. *International Journal of Information Systems and Project Management*. 9(3), 21–40. <https://doi.org/10.12821/ijispm090302>

## Appendix

### Appendix A. World Bank Indicator

INDICATOR\_CODE: NE.EXP.GNFS.CD

INDICATOR\_NAME: Exports of goods and services (current USD)

SOURCE\_NOTE: Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, finance, information, business, personal, and government services. They exclude employee compensation, investment income (formerly called factor services), and transfer payments. Data are in current U.S. dollars.

### Appendix B. Questionnaire

#### B.1. Questionnaire Questions

Q1: Do you have a recent work experience in an Egyptian company that exports software?

- Yes
- No

Q2: What is the size of your company?

- Start-up
- SME
- Large corporation

Q3: From your experience, which of the following critical success factors most affect the global software development exports from domestic companies to the world?

Critical Success Factors: (Options are from 1 to 10 for each)

- Cost saving, hence, the prices your company offers to its clients.
- The availability of skilled staff and certified developers in your company
- The size and quality of the IT infrastructure and the availability of sufficient hardware and software resources to maintain large development projects.
- The quality of the software products your company delivers.
- How efficiently does your company manage its relations with its clients?
- The availability of your company's track record of successful projects.
- How efficiently does your company manage its projects and contracts?
- The availability of Service and Process Improvement (SPI) Certifications such as CMMI and ISO in your company.
- The level of experience and knowledge your company has about the client's language and culture.
- The ability of your company to deliver projects and products on time and its responsiveness to the client.
- The ability and frequency of your company to conduct proper negotiations with its clients.
- The organization's ability to conduct proper requirements elicitation (gathering) and write a clear Software Requirement Specification (SRS) paper.
- The availability of your company's overseas offices.

#### B.2. Responses to the questionnaire



**Table 1**  
*Responses of the questionnaire*

Q1	Q2	Q3												
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Yes	SME	6	10	9	10	10	8	10	5	6	7	6	8	5
Yes	Start-up	5	9	7	7	7	9	9	4	8	8	8	7	1
Yes	Start-up	9	9	8	9	10	8	9	7	8	8	8	8	9
Yes	SME	7	9	9	10	9	8	8	6	9	9	9	9	8
Yes	Start-up	10	9	9	9	9	9	9	9	8	9	5	5	5
Yes	Start-up	7	8	9	9	8	9	5	1	6	9	7	10	9
Yes	SME	5	8	1	10	10	8	10	1	10	10	10	10	5
Yes	SME	7	8	9	8	8	9	9	3	8	8	8	9	9
Yes	SME	6	8	5	8	5	9	7	1	10	7	7	10	1
No	Start-up	10	9	5	9	8	9	9	4	9	9	9	8	4
Yes	SME	8	9	7	10	10	8	9	6	9	8	7	8	6
Yes	SME	7	7	10	9	8	9	10	1	9	8	8	10	1
Yes	SME	7	8	7	8	8	9	9	9	7	8	8	9	9
Yes	SME	5	9	7	8	8	9	9	8	6	8	8	6	6
Yes	SME	4	7	9	9	7	7	8	2	10	9	7	7	1
Yes	SME	8	10	9	10	10	9	10	8	6	9	9	10	7
Yes	SME	7	4	2	8	8	9	7	3	8	7	8	8	1
Yes	SME	9	10	8	10	10	9	10	1	8	10	10	7	8
Yes	Start-up	8	9	8	9	7	9	8	7	10	9	9	9	8
Yes	Start-up	10	10	10	10	10	10	10	10	10	10	10	10	10
Yes	Start-up	5	7	4	8	8	8	8	8	9	7	8	7	1
Yes	Start-up	7	10	6	10	10	7	8	1	7	9	9	5	5
No	Start-up	8	4	3	8	8	3	9	2	9	6	3	1	1
Yes	SME	5	9	9	9	10	10	10	5	10	10	10	10	1
Yes	Start-up	10	10	7	9	8	10	9	1	9	9	8	9	10
Yes	Large corporation	8	7	8	9	8	8	8	9	9	9	8	8	7
Yes	SME	10	9	8	8	9	9	7	1	10	8	9	10	4
Yes	Start-up	10	7	8	8	9	8	8	1	9	8	8	8	1
Yes	Start-up	6	6	4	6	7	8	6	6	8	9	8	7	9
Yes	SME	9	8	3	9	9	6	8	2	8	3	5	2	7
Yes	SME	8	10	8	10	10	10	8	5	10	10	8	8	8
Yes	SME	10	5	8	9	8	7	7	9	9	7	9	7	3
Yes	SME	9	7	9	9	9	10	9	4	6	10	10	10	8

**Source:** Prepared by authors.

### Appendix C. NPS Calculations

Table 2 below shows the steps to calculate the NPS score for each CSFs. The first column of the table shows the critical success factor. The second column (Distractors) is calculated by counting all responses in which the responder selected a value from 1 to 6. The third column (Promoters) is calculated by counting all responses in which the responder selected a value of 9 or 10. The fourth column (Distractors %) calculates the percentage of distractors to all responses. The fifth column (Promoters %) calculates the percentage of promoters to all

responses. The last column calculates the score of the NPS indicator by subtracting the preceding column from the column before it (Promoters % - Distractors %).

**Table 2**

*Steps to calculate NPS score for each CSF*

CSF	Distractors (1:6)	Promoters (9:10)	Distractors %	Promoters %	NPS (Promoters % - Distractors %)
Cost saving, hence, prices	9.0	10.0	29.0	32.3	3.2
The availability of skilled staff	3.0	16.0	9.7	51.6	41.9
Size & quality of the IT infrastructure	7.0	11.0	22.6	35.5	12.9
Quality of deliverables	1.0	21.0	3.2	67.7	64.5
Relations management	1.0	16.0	3.2	51.6	48.4
Track record of successful projects	1.0	18.0	3.2	58.1	54.8
Project management	2.0	16.0	6.5	51.6	45.2
Service and Process Improvement (SPI)	21.0	5.0	67.7	16.1	-51.6
Knowledge of the client's language and culture	5.0	16.0	16.1	51.6	35.5
Timely delivery and responsiveness	1.0	16.0	3.2	51.6	48.4
Frequency and quality of negotiations with the clients	3.0	11.0	9.7	35.5	25.8
Requirements of elicitation and writing good SRS document	4.0	14.0	12.9	45.2	32.3
The availability of your company's overseas offices	16.0	7.0	51.6	22.6	-29.0

**Source:** Prepared by authors.

## Appendix D. Interviewee Profiles

### Interviewee (A)

He has a master's degree in computer science from the University of Louisville (UoL), Kentucky, USA. He is an expert in software development and project and service management domains. He founded an offshore development company in Egypt more than 10 years ago with a successful track record of projects from the USA and Canada. I have been involved as a developer in some of these projects, such as batterieexpert.com and galaxymachines.com commercial systems. The interview with him was conducted on Saturday, March 10, 2023.

### Interviewee (B)

He is the manager of the Nilepreneur incubation program for software start-ups. He is a matter expert in the domain of software development with 13 years of experience in product management. Nilepreneur is a program founded by Nile University to provide incubators for software start-ups in Egypt. The program has successfully supported over 70 start-ups with a total revenue of over 140 million, which was started by investments of about 30 million. Nilepreneur is an NGO (Non-Governmental Organization). However, it plays a similar role to that of the government. The interview with him was conducted on Tuesday, March 14, 2023.

### Interviewee (C)

He is a seasoned business developer, recruiter, and organization consultant in ICT from the Netherlands. He is currently deployed by the Dutch Ministry of Foreign Affairs / CBI in the Egypt ITO program as a Business Export Coach for SMEs targeting Europe for exporting. The interview with him was conducted on Wednesday, April 5, 2023.

## إطلاق إمكانات مصر في تطوير البرمجيات العالمية: تحليل عوامل النجاح الحاسمة والعقبات والاستراتيجيات

### المستخلص

تستعرض هذه الدراسة واقع قطاع تكنولوجيا المعلومات والاتصالات في مصر ضمن سوق تطوير البرمجيات العالمي (GSD) Global Software Development، الذي شهد توسعاً ملحوظاً مع تسارع التحول نحو العمل عن بُعد بفعل جائحة كوفيد-19. ورغم توافر الفرص، لم تتحقق لمصر الاستفادة الكاملة منها. وتهدف الدراسة إلى تحديد العوامل التي تحدّ من قدرة مصدري البرمجيات المصريين على تعزيز حصتهم في هذا السوق، واقتراح استراتيجيات لدعم أنشطتهم. وتكشف النتائج عن أولويات عوامل النجاح الحاسمة (CSFs) Critical Success Factors في تحقيق التنافسية، حيث تحتل جودة المنتج وسجل المشاريع الناجحة موقع الصدارة. ومن التوصيات الأساسية تعزيز اندماج الشركات الصغيرة لإنشاء كيانات أكثر تنافسية، وتحسين البنية التحتية، ووضع تشريعات تدعم الشركات المصرية العاملة دولياً. كما يُوصى بالتركيز على ضمان الجودة، وتطوير سجل ناجح للمشروعات، وتعزيز العلاقات مع العملاء من خلال إدارة متخصصة. وتقدم هذه الدراسة رؤى عملية لتعزيز حضور مصر في سوق تطوير البرمجيات العالمي. وللبحوث المستقبلية، يُقترح استكشاف الأدوات والإجراءات اللازمة لتحسين جودة البرمجيات المطوّرة محلياً، وتوثيق إنجازات مصدري البرمجيات، إضافةً إلى دراسة سبل دعم الحكومة لاندماج الشركات الصغيرة، وتعزيز البنية التحتية، ووضع تشريعات تحمي الشركات المصرية في الأسواق الخارجية.

**الكلمات الدالة:** صناعة تكنولوجيا المعلومات، عوامل النجاح، السوق العالمي، تطوير البرمجيات، مُصدّرو البرمجيات المصريون