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The labor market in the context of digital transformation: shifts in occupational structure and challenges of social adaptation

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Abstract :

There have been numerous changes in both the economy and society as a result of developments in Information and Communications Technology (ICT). These changes form part of a broader movement towards digital transformation across all aspects of life. As a result of Digital Transformation, the labour market is experiencing strong pressures to change its structure and functions through the creation of new types of jobs, the elimination of many "traditional" jobs (mainly those with routine tasks, requiring physical input and/or skillsets that do not change), and by virtue of creating a workforce which requires significant amounts of digital and cognitive skills, (i.e. knowledge workers). With the advent of Digital Transformation there have also been new types of working models and, subsequently, new types of employment relationships between employees and employers that have created significant new ethical, legal, and sociological issues for countries in varying stages and structures of development.

Keywords: Labor market, digital transformation, occupational structures, social adaptation

Introduction

There have been numerous changes in both the economy and society as a result of developments in Information and Communications Technology (ICT). These changes form part of a broader movement towards digital transformation across all aspects of life. As a result of Digital Transformation, the labour market is experiencing strong pressures to change its structure and functions through the creation of new types of jobs, the elimination of many "traditional" jobs (mainly those with routine tasks, requiring physical input and/or skillsets that do not change), and by virtue of creating a workforce which requires significant amounts of digital and cognitive skills, (i.e. knowledge workers). With the advent of Digital Transformation there have also been new types of working models (e.g., telework) and, subsequently, new types of employment relationships between employees and employers that

have created significant new ethical, legal, and sociological issues for countries in varying stages and structures of development.

These transformations have produced a set of challenges, most notably the growing digital divide among individuals, increasing job insecurity, and the decline of job stability, in addition to the reshaping of professional identity and work values. Digitalization has also contributed to the emergence of new forms of inequality, linked to individuals' possession of digital skills.

Digital transformation provides significant opportunities for new job creation, to create a more productive workplace, and to enhance innovation. However, the ability of individuals and institutions to realise the potential benefits of digital transformation will depend largely on their capacity to adapt. This can be done by developing education and training systems, increasing digital skills, and aligning the learning outcomes of educational institutions with the needs of the labour market. Digital transformation is therefore a twofold process combining opportunities for growth along with the possibility of being excluded.

Thus, the implementation of digital transformation can be considered a double-edged sword where opportunities for growth exist but also the impact of limiting individuals socially. Therefore, to achieve an equitable balance between social justice and economic efficiency, comprehensive policy approaches need to be adopted.

Research Problem: How has digital transformation affected the structure of the labor market, and what are the sociological implications of these changes on employment patterns, professional relationships, and the integration of individuals into the economic system?

Sub-questions:

• What is meant by digital transformation and what are its main manifestations?
• How has digital transformation changed the nature of the labor market?
• How has digital transformation affected work relations and social adaptation?
• What are the social challenges associated with the digital labor market?

Research Hypotheses:

- ➲ Digital transformation contributes to the restructuring of the labor market by reducing traditional jobs and creating new ones.
- ➲ Digital transformation leads to the emergence of unstable forms of work (flexible work, temporary work, platform-based work). Digital transformation deepens the social divide between those who possess digital skills and those who lack them.
- ➲ Digital transformation imposes a redefinition of the relationship between the worker and the institution.

Study Objectives: The main objectives can be summarized as follows:

- Analyze the concept of digital transformation and its dimensions.
- Understand the impact of digitalization on the labor market.
- Identify changes in the structure of occupations.
- Examine the social implications of digital transformation.
- Propose mechanisms for adapting to these changes.

Importance of the Study: This study is important because it:

- Addresses a current topic that requires continuous research.

- Contributes to understanding deep transformations in the labor market.
- Helps decision-makers develop effective employment policies.
- Provides a sociological perspective that goes beyond narrow economic analysis.

Methodology: The study relies on the descriptive-analytical method to analyze concepts and transformations, along with a sociological analysis to understand the social dimensions.

Axis One: Digital Transformation – Concept and Dimensions

1. Definition of Digital Transformation: Digital transformation is the process through which institutions and societies shift from traditional patterns to models based on digital technologies, with the aim of improving performance, increasing efficiency, and creating added value.

It is also the transition of institutions from a traditional business model to another model that relies on digital technologies in innovating products and services, as well as management and marketing methods, while providing new revenue channels through the development of a digital strategy. This transformation can only occur through an assessment of digital capabilities and a study of digital investment requirements, within the framework of digital marketing activities, along with the presence of a managerial will to change toward digital transformation (Ben Wasel, 2022)

2. Objectives of digital transformation: The goals of digital transformation are provided below: (Chaouchi & Khelouf, 2023, p. 19)

- ✓ To create innovative & collaborative tech, cultural and financial systems at all levels of an organisation and society;
- ✓ Change educational systems to create new skills and prepare individuals for success in a digital world and workplace;
- ✓ Create and maintain digital communication infrastructure, ensuring management and accessibility of the Infrastructure while balancing the service quality and costs associated with downloading these services.

Strengthening the protection of digital data, transparency, ensuring independence requirements, and building trust. Improving access to services, and establishing controls, mechanisms, and quality of digital services provided to society.

Applying new and innovative business models, and improving the regulatory framework and technical standards. Monitoring the digital gap within the university environment, whether at the level of infrastructure or digital competencies.

3. The significance of digitizing a business design: E-business digitization is viewed as a building block of any business improvement, as evidenced by the following four main arguments (Bouzidi, 2021, p. 63).

3.1 Enhancing operational processes: By digitizing the business, an organization is able to streamline administrative and functional processes with fewer chances for human error resulting in a higher quality of output. The use of digital technologies also helps to streamline administrative processes, resulting in faster and more efficient service delivery to customers.

3.2 Increase in competitiveness: By digitizing the organisation's business processes, advantages can be created through the use of new innovative and non-conventional solutions, therefore, giving the organisation a competitive edge in the marketplace as well as creating new opportunities for growth and expansion that were not previously available.

3.3 Improvement in customer/service delivery experience: The use of sophisticated data analysis tools allows E-businesses to develop a greater understanding of the behaviour of their customers and the needs of their customers, enabling E-businesses to provide the most comprehensive integrated customer service possible to their customers by exceeding the customer's expectations and meeting the customer's needs with the highest degree of flexibility.

3.4 Improvement in transparency: Digitization supports E-businesses by providing the ability to measure and monitor performance and provide real-time information on the process, therefore providing a greater level of transparency to all stakeholders and affording a high degree of security in accessing information directly.

3.5 Rationalisation des dépenses : L'automatisation, l'organisation des processus numériques constituent un bon moyen de réduire les coûts d'exploitation et les efforts perdus, en même temps qu'elles permettent aux institutions de rediriger des ressources financières et humaines vers d'autres points de croissance.

3.4 Creating the principle of clarity: The digital revolution provides means for observing performance and evaluation of processes in real time, which improves clarity of processes to all parties involved, and provides a safe and direct path to the availability of information.

3.5 Rationale of expenditures (cost savings): Automation and organization of digital processes will decrease operational costs and eliminate wasted time, allowing organizations to reallocate their evolving fiscal and human capital toward other areas of development.

3.6 The creation of new careers: In addition to enhancing job opportunities, digital transformation supports transparency in both its economic and social dimensions. Digital transformation acts as a powerful means for creating new channels for the movement of information, increases productivity, and ultimately creates a higher quality of services.

3.7 Development of sustainable growth: The digital transformation will help support the improvement of the health, educational and energy sectors using environmentally friendly technology. It is also a tool for helping develop smart communities, within the framework of creating sustained inclusive growth and reduction of carbon and other environmental emissions. (Khawatara, 2021, p. 110).

4. Types of Digital Transformation

The digital transformation of various sectors has four main types (Mohamedi, 2021, p. 63):

4.1 Digital transformation of government, as it provides citizens with more convenient access to government services while enhancing the quality of those services. By creating electronic platforms and mobile applications, governments can provide a better citizen user experience, and streamline their administrative processes.

4.2 Digital transformation of organizational processes: Organizations will focus on their internal performance and decision-making processes and use data analytics tools to improve

continuously. By automating their repetitive tasks, organizations will create a culture where continuous improvement becomes a standard operating procedure.

4.3 Digital transformation of manufacturing and production: The focus of this form of digital transformation will be to integrate robots and AI technologies into factories and production processes so that traditional manufacturing and production methods can be converted to smart manufacturing and production environments, resulting in increased productivity levels through improved quality of work.

4.4 Digital transformation of finance: Digital transformation in the financial sector will result in new banking products that offer consumers a wider range of flexible banking options, such as electronic wallets, smart payment systems, etc. The goal will be to create secure and convenient banking experiences that will meet the needs of today's banking consumers.

4.5 The digital transformation of education seeks to improve the entire education process, by providing modern methods of delivery and integrating technology into future learning using distance-learning tools and interactive media while ensuring that the latest forms of educational content can be delivered to students without restrictions based upon time or place.

4.6 Digital transformation in tourism and hospitality aims to enhance the overall experience of travellers by simplifying the processes for booking hotels and other forms of accommodation through innovative technologies, including, but not limited to, augmented reality, making their overall travel experience more enjoyable and interactive.

4.7 Digital transformation in marketing and sales leverages the use of digital channels (i.e., the internet) and social media sites to create intelligent sales models that accurately target potential customers as well as serve their respective needs.

4.8 Improving the overall customer experience (CX) means creating a relationship with the customer that is based upon providing services that are tailored to meet their specific needs, using data analytics and artificial intelligence.

Digital transformation is a fundamental building block for the growth and development of various industries, due to the fact that each type of business contributes to encouraging the development of new ideas and efficiencies, and assists the various types of entities in remaining relevant and competitive in an industry that is frequently changing as a result of the avances being made in technological processes.

5. Dimensions of Digital Transformation: Digital transformation is based on several major dimensions:(Ashraf, 2025, p. 10)

A. Technology Dimension: Technology is the use of new/modern technology; such as:
Artificial Intelligence
(e.g.)The Internet and Big Data Analytics

B. Economy Dimension: Economy refers to:
Emergence of a digital economy
Collapse of traditional industries
Growth of the top (8) digital companies

C. Social Dimension: Example of social interaction refers to:
Changing methods of social interactions

Changing professional identity
Professional Individualism becomes the norm
D. Cultural Dimension: Examples of cultural changes include:
Development of a new digital culture
Preferred (Work-related) Values are changing.

6. Challenges for digital transformation: The primary barriers to the advancement of technology can be summarised as follows (Hamou, 2022, p. 287).
6.1 Deficiencies in the technological infrastructure: There are inconsistencies regarding the digital landscape; gaps in the level of coverage for each area, in addition to issues surrounding internet speed and high costs associated with data services result in a barrier to equality and universal accessibility for the entire population to access digital services.
6.2 Shortage of Specialized Personnel: A lack of qualified, skilled and trained employees is a major strategic challenge for the state because they need to step in to support training and development of human resources who will be able to successfully manage and implement complex digital projects and compete globally.
6.3 Legislative and Legal Gaps: The legal framework in its current form is outdated and does not meet the requirements of the digital economy; specifically, with respect to privacy and protection of personal data, the enforcement of digital IP rights and the development of regulatory frameworks that will facilitate e-transactions.
6.4 Resistance due to socio/cultural reasons! Digital solutions are sometimes either slow to be adopted or outright rejected in certain communities (especially if they are in an underdeveloped country) because folks do not fully understand how important technology really is or simply because they want to stick with what is familiar. This becomes an impediment to getting digital culture established.
6.5 Cybersecurity concerns. Moving into the digital world also means that we are more exposed than ever to attempts by bad actors (hackers) to steal/compromise both personal and governmental data so it's crucial for us to have very strong security systems to address those risks and develop strategies to prevent cybercrime from occurring.

Axis Two: The Labor Market in the Context of Digitalization

1. Concept of the labor market: The labor market represents one of the fundamental pillars of the economic system. Despite the diversity of theoretical and intellectual interpretations of this concept, it can be summarized into two main approaches (Arezki, 1989, p. 21) :
Interactive concept: The researcher (Arezki, 1989) considers the labor market as the space or “field” where the demands of job seekers intersect with the needs of institutions. Through this interaction, key variables such as employment levels and wage levels are determined.
Resource-based concept: It is viewed as a dynamic environment that contains qualified human capacities willing to engage in the production process and to pursue professional career paths.

2. Characteristics of the labor market: The labor market is distinguished from other markets of goods and services by unique characteristics that regulate its functioning, the most important of which are:

Limited perfect competition:(Sekhri, 2005, p. 172) notes the absence of a "uniform wage" for similar jobs, which is attributed to limited information flow about higher-paying opportunities, as well as weak geographical or occupational mobility among some workers. Flexibility in discrimination: the ease of classifying and differentiating human resources based on demographic factors (such as age and gender) or cultural backgrounds, even when technical competence is equal.

Influence of behavioral factors: labor supply is affected by workers' personal preferences, such as the balance between income and leisure time, as well as the nature of human relationships within the work environment.

Technological transformation relates to the impact of technological progress on the labor market, which are manifested in two types of unemployment (Schnapper, 1994): Displacement through automation is when traditional jobs are being lost due to machines or automation replacing human labor.

The second type is referred to as the skills gap, where there are increasing numbers of new jobs coming into existence that require skills to perform than those that have previously existed requiring a certain level of education and/or training to work in these new positions. The equilibrium condition refers to the state of the labor market. The labor market is in an equilibrium condition governed by the law of supply and demand. It is only when both supply and demand forces exist in the labor market at the same time, and the behavior of those in equilibrium acting as an "economic system" is occurring in the labor market.

3. The Three Main Attributes of the Digital Workforce: Royal Cyber does a fantastic job to summarize the three primary skills found in the digital workforce (Articles, 2024) as follows:

1. Analysis: Future learning for many professions will provide individuals with the skills required to adapt to the rapid rate of change occurring within the labour force (due to digital transformation). Analytical thinking is a key component of many future learning requirements that will aid an individual in understanding, evaluating and problem solving systematically, thereby ensuring that the decisions made by or on behalf of the person will be properly based on data and allow for creation of new innovative solutions. Analytical thinking will provide an opportunity for the person to continue to learn and keep current with data will allow a person to continue growing in their profession.

2. The Digital Labour Market: Understanding the digital labour market is becoming increasingly important to ensure that individuals do not miss out on some of the newly created jobs due to the advent of technology and need to have a clear understanding of the skill set being required of employees by the modern institutions. Job education, as well as career guidance is an essential component of assisting individuals in selecting the most appropriate job opportunities.

3. Digital Learning Platforms: Digital platforms for Education are ubiquitous; therefore, all teachers and students must be fully familiar with how to utilise them effectively, e.g. designing

motivating, interest inducing digital content, engaging learners through interaction and active engagement.

4. Digital skills: The digital workforce has evolved significantly over the last twenty years as the skills that were needed to find success have also changed. Within this arena, digital skills have become a necessity for obtaining work within the labour force. This new workforce includes having the ability to manage data, as well as possess a basic understanding of the analytical process in addition to utilising the tools of digital marketing. As such, digital skills should be developed through various educational systems through such as: training programs; course offerings; and/or through self-directed study.

5. Development of interactive content: The traditional paradigm of education as merely a method of transmitting information has morphed into a new paradigm whereby education is now based on interacting with the provided information. Therefore; when designing educational content; one must design in a way that engages those involved with the content. Some of the ways in which those engaging with content can be stimulated to do so include multimedia, as well as the use of interactive activities; both of which serve to improve a person's ultimate comprehension and knowledge of the presented material.

6**. Digital communication/Teamwork:** Skills related to communications, as well as skills related to working as a cooperative team have become the cornerstones of the digital business community because of the increasing number of businesses that rely on virtual teams to complete their daily tasks. Therefore; one must be able to effectively utilise digital communications tools effectively; as well as, work collaboratively with others in order to achieve the desired results.

To prepare people for success in the labour force of today and to meet the requirements of the digital workforce; one must focus on developing both analytical and digital skills, while supporting continuous learning; in addition to; using interactive methods of delivering such skills.

7. Challenges of the Arab labor market: In light of the current digital revolution, the labor market faces complex challenges that require a rapid response: (Chalouf, 2017, p. 445)

- **Lack of digital awareness:** a large segment of the workforce lacks a deep understanding of artificial intelligence applications, which reduces its ability to adapt to rapid changes.
- **Weak infrastructure:** insufficient investment in digitalization and low internet quality in some countries hinder the effective adoption of smart technologies.
- **Concerns about job displacement:** there are widespread fears that digital transformation may replace routine jobs, while in reality it leads to the “restructuring” of jobs and the creation of opportunities requiring advanced digital skills.

- **Skills gap:** young workers suffer from a shortage in future-oriented fields such as big data analytics and cybersecurity, which requires a major reform of education and vocational training systems.
- **Lack of regulatory frameworks:** there is an urgent need for clear laws and governance to regulate the use of artificial intelligence, ensuring a balance between economic growth and the protection of workers' and companies' rights.
- **At the level of professional relations:** there is a decline in job stability, weak social protection, exclusion of unqualified groups, in addition to a loss of professional identity and the emergence of social isolation due to digital work pressure.

8- Changes in the labor market:

A) Some jobs will go away: like routine jobs and basic manual labor jobs.

B) Some new jobs are created: like software developer, data analyst, information security officer, and platform-based manager.

C) The type of work will change: like working from home, being self-employed, and working for companies on platforms.

9 - How to adapt to the digital workforce (Copyright: ILO, pages 6-7)

9.1 Investing in digital infrastructure and closing the digital divide:

By creating infrastructure that is digital, affordable, reliable and inclusive, effective digital transformation can occur; thus, reducing the major inequities in connectivity, especially in low-income countries, rural areas and war-torn areas.

9.2 Investing in a digitally literate workforce and promoting lifelong learning:

To close the digital divide is more than just providing devices and internet, it's primarily about building human capital; therefore, it is necessary to incorporate digital skills and STEM education into early childhood education through higher education as well as retraining and upskilling workers to keep up with technological advances.

9.3 Effective Employment Services and Social Protection Systems

High quality employment services and social protection systems (including career services, wage support, and assistance to those affected by automation and job losses) that will provide individuals with the support they need in their transition towards the digital economy are necessary to support a smooth and fair transition to the digital economy.

Expanding social coverage will further protect the livelihoods of vulnerable groups in the labor market through job security, and reducing patterns of inequality and long-term unemployment needs to connect continued learning (for example, through skills training) and the provision of social protections.

9.4 Invest in Labor Market Information Systems (LMIS)

Labor Market Information Systems (LMIS) are fundamentally a key pillar supporting countries' ability to adapt to the requirements of digital economies through providing up-to-date and reliable labour market-related data that will allow for effective labour market monitoring, the identification of skill gaps, trend predictions about the future of the labour market, and aligning education and training systems with the actual needs of the labour market.

9.5 Enabling Digital Transformation and Artificial Intelligence in SMEs and Supporting Innovation:

Micro, small and medium-sized enterprises struggle to adopt digital technologies for a variety of reasons, including limited resources, low levels of readiness, and inadequate supportive infrastructure. To speed up this process, an incremental approach is recommended which includes :

Targeted government support and investment in infrastructure by way of innovative forms of financing, incentives for adopting technology, and supporting programs for innovation.

Facilitation of access to credit that meets the needs of these enterprises; and enhancing the entrepreneurial ecosystem.

Initiating large scale training programs for business owners and employees to provide practical digital skills in order to improve their competitive position.

9.6 Supportive policies For Developing a Digital Transition that Supports the Development of Decent Jobs - Work Has To Be Considered A Type Of Employment Like Any Other Type Of Employment. (Organization, 2025, pp. 6-7)

A comprehensive government approach to digital transformation through a decent work lens requires coherent approaches to integrating digital policy solutions into employment systems to ensure quality job creation as well as addressing social inequalities through inclusion strategies; clarifying the roles of digital and AI in work policies; and engaging with partner organizations to develop and periodically review these digital transformation efforts in order to adjust to technological advances.

9.7 Improve the legal and regulatory framework in order to facilitate a fair and inclusive transition to the digital economy:

Currently there is an urgent need to have future-looking, balanced, legal frameworks capable of supporting innovation and protecting rights, including:

Improving existing laws and aligning labour laws with the changing nature of digital work (e.g. providing more transparency/accountability in AI-based decision making) and improving the protection of both data and cyber-security, as well as extending social protection systems to platform workers & temporary jobs (in alignment with the standards of the ILO).

9.8 Enhancing social dialogue for an inclusive and equitable digital transformation:

A key element in achieving successful digital transformation is fostering positive interactions among governments, employers and employees to establish, on one hand, the equilibrium between innovation and social equity, and on the other hand, the basis for developing fair and sustainable public policy. By enhancing the quality of work life through the inclusion of employees in it's respective efforts towards digitalization, it will bolster trust and thus aid in the equitable distribution of the perceived benefits of technology.

9.9 Promoting growth through increasing regional and international collaboration using AI and digital transformation:

Activating the role that institutions can play in exchanging policies and allocating resources with an emphasis on supporting least developed economies; establishing governance with regards to AI as a fundamental aspect of inclusive economic development; continuing to

engage in international partnerships (e.g., Social Justice Coalition) to ensure that national strategies are consistent with/compatible with international standards.

Conclusion

Digital transformation is much more than a technology change. The effects of digital transformation will create changes across many areas of our lives including our working lives and the labor market. As digital transformation creates new possibilities, it also creates challenges for us all that require us to come up with responses that span more than one dimension. To adapt to this emerging reality will require flexible educational/training policies, enhancing digital equity, and re-thinking how we work to strike a balance between economic and social equity.

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