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The required engineering skills for Saudi labor market after automation

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ABSTRACT

This paper aims to explore the required engineering skills in the Saudi labor market before and after automation. For this purpose, data were collected from 230 participants from different engineering sectors with a structured questionnaire. The data were coded and analyzed using SPSS software. The researcher found that the existing labor market skills are teamwork, verbal communication, willingness to learn, understanding, and taking directions for work assignments. Skills required after automation are: computer skills, technical skills, ability to use modern tools and equipment, the ability to design a process to meet desired objectives. The researcher recommends that curriculum reform as part of an automation strategy to improve labor market skills.

Keywords—*Automation, Skills, Saudi Arabia*

1. INTRODUCTION

The rapid technological, whether the development in all life aspects including work fields caused changes in entire job sectors, and technological improvements are stepping in and executing human-performed jobs. This technological revolution led to the concept of automation to rise.

Automation is defined as "the use of computers and machines instead of people to do a job" (Longman, 2009). Three types of automation identified in the literature, the mechanization of conventional production, the skills needed for this type are similar to those before automation; mechanization of processes, this type requires eliminating the old skills and creating new ones; computerization of paperwork, this type requires hiring employees. A worrying statement in Autor's published paper (2015) when he mentioned that plenty of losses in factory jobs have been related to the increase in the service industries or office jobs. Nevertheless, even office jobs are beginning to move in to be elucidated by automation.

However, a deeper discussion of this topic needs a multi-vision understanding and view, as not all sectors are affected equally by these advances in technology (Hee Chang., 2016). Employability skills development is a combination of technical and generic skills. Training needs, personal traits, academic skills, communication skills, soft skills, corporate skills, technical skills, job-seeking skills, and schooling are the nine expected skills by employers from engineers (Prasad, 2015). Much work is done around the world to identify and analyze the skills for modern engineers. A study carried out to investigate and quantify the gap in engineering skills in the Middle East and North Africa. One hundred thirty-two participants completed the online questionnaire. As a result, a significant gap founded in all the 36 skills explored. Skills need to be improved to meet the industrial requirement. Cooperation skills, communication skills, and personal accountability are skills for employment (Ramadi, 2016). In Malaysia, 32.1 percent of engineers from different institutes are unemployed. The employer's expectation is very high. So, they are looking to hire qualified engineers. Over time, the demands and the new requirements for skilled engineers changed. The result of the study shows that there are a gap and mismatch between employers, accreditation bodies and academics (T. Tan, 2017). This research aims to answer the following questions:

- What are the existing labor market skills?
- What is the new set of skills required in the labor market after automation?

2. LITERATURE REVIEW

1.2 Automation

New technologies, new development lead to a new type of anxiety of replacing humans by machines in developed and developing countries and economies. The estimated numbers of professions indicate what is technologically possible, but it is difficult to be definitive about future quantitative employment outcomes of the automation technologies. Low skilled workers with simple entry-level and necessary skills process-driven tasks with low thinking activity are thought to be candidates of replacement by machines. Highly-skilled workers who carry out complicated tasks that require experience, expertise, critical thinking, are thought to be less threatened by the idea of automation (Ramaswamy, 2018). Automation is and will be in the future the most critical part of manufacturing, as it leads to quick processes, achieving process targets with high quality, and increased speed. However, nothing is complete, and there are many things that a fully automated system is incapable of achieving. Inventions in artificial intelligence, robotics, additive manufacturing, remote connectivity, advanced analytics, and the Internet are all facets to automation which has already started transforming the global workforce and have rapidly increased the possibility of bringing these technologies into the workplace. Various forms of automation increasingly filled our daily work and sometimes threatened to displace it (Winterberg, Lemos, 2017).

1.3 Skills

The term "Skills" commonly used when considering the ability to carry out a task. Skills sometimes referred to as 'Competencies.' Competencies are defined by the Organization for Economic Cooperation Development (OECD), 2002 as: "the ability to successfully meet complex demands in a particular context." New challenges, new opportunities and different circumstances due to continuous changes in knowledge, equipment, systems, and management always face engineering professions, so this profession requires an engineer who has a strong theoretical background and equipped with employability skills which defined as the "transferable skills needed by an individual to make them 'employable'", (Gowsalya, 2015). Such skills include self-learning, problem-solving ICT knowledge, excellent interpersonal and communication skills, ability to use their initiative but also to follow instructions and leadership skills where necessary and others. Higher learning institutions and employers need to have a shared understanding of which skills should own by engineering graduates who must be ready to indulge in the labor market (Zaharim, 2010; Gowsalya, 2015)

3. METHODOLOGY AND RESULT

The strategy utilized in this research is a questionnaire survey, which considered as the most suitable way to collect data, as this strategy will ensure keeping the collected data with a degree of accuracy and reliability, and it also can access the researcher to compare easily between the collected data due to the ability to standardize it. In order to accomplish this research professionally and with a degree of reality, a wide number of samples required, and a questionnaire survey is a best and most efficient way of doing this. This questionnaire will be distributed online to identify skills before and after automation on the labor market in Saudi Arabia. the total number of responses, which answered this questionnaire, is 230. The questionnaire contained a set of questions related to the hypothesis, variables and objectives of the research to study the potential of automation is available in the Kingdome of Saudi Arabia.

3.1 Questionnaire Design

Primary data collected through questionnaires. The questionnaire of the current research contained several skills before automation and after automation to identify the impact of automation on labor market skills in the engineering sector of Saudi Arabia. Furthermore, the questionnaires were used five-point Likert scale to knowing perspectives of the participants, (Very Important) has been given (5), and (Important) is given (4), whereas (Neutral) is given (3), and (Less Important) is given (2), and finally (Not At All Important) is given (1). Other subjective multiple-choice questions asked as well.

3.2 Result

- The mean for all skills before automation is 3.94, and the standard deviation for all skills is 1.248. Furthermore, the mean for skills range from 3.79 to 4.07, and standard deviations for skills range from 1.180 to 1.319. The teamwork is the most important skill before automation, and the rank was 1st, as well as the main important skills before automation are verbal communication, willingness to learn, understanding and taking directions for work assignments, and customer service skills.
- The mean for all skills after automation is 4.03, and the standard deviation for all skills is 1.156. Furthermore, the mean for skills range from 3.67 to 4.27, and standard deviations for skills range from 1.057 to 1.299. The computer skills is the most important after before automation and the rank was 1st, as well as the main important skills after automation are technical skill, ability to use modern tools and equipment, ability to design a process to meet desired objectives, willingness to learn, ability to analyze and interpret data, and integrity (understanding and applying professional and ethical principles).

4. DISCUSSION AND RECOMMENDATION

Finally, the existing labor market skills in Saudi Arabia are teamwork, empathy, reliability, verbal communication, written communication, understanding and taking directions for work assignments, and customer service skills. The new set of skills required after automation are computer skills, technical skills, ability to use modern tools and equipment, ability to design a process to meet desired objectives, willingness to learn, ability to analyze and interpret data, and integrity. The mean of all skills after automation is higher than before automation. Therefore, the skills after automation are more important than before automation as well as this means the automation is significantly affected by labor market skills. The following guidelines to prepare graduation engineers for the new set of skills:

(a) Encouraging graduation to practice computer skills by themselves.
(b) Providing some courses to graduation to improve technical skills.
(c) Providing some courses to graduation that help them to use modern tools and equipment effectively.
(d) Increasing graduation ability to design process to meet desired objectives and ability to analyze and interpret data by providing some courses.
(e) Providing training courses for graduation to ensure graduation has a strong theoretical background and equipped with employability skills, which is defined as the "transferable skills needed by an individual to make them 'employable.'
(f) Improving graduation skills to combine theoretical background and employability skills by providing training courses.
(g) Developing employability skills required for graduate, which is a combination of technical and generic skills by improving personal traits, academic skills, communication skills, soft skills, corporate skills, technical skills, job-seeking skills.

4.1 Skills before automation

Table 1: Skills before automation

Skill	Mean	Ranking
Teamwork	4.07	1
Verbal communication	4.05	2
Willingness to learn	4.04	3
Understanding and taking directions for work assignments	4.03	4
Integrity	4.00	5
Customer service skills	4.00	6
Ability to design a process to meet desired objectives	3.99	7
Emotional Intelligence	3.99	8
Ability to identify and solve technical problems	3.98	9
Self-motivation	3.98	10
Self-discipline	3.97	11
Ability to analyze and interpret data	3.95	12
Accepting responsibility of actions	3.93	13
Written communication	3.89	14
Ability to use modern tools and equipments	3.87	15
Creativity	3.87	16
Computer skills	3.85	17
Reliability	3.83	18
Empathy	3.79	19
Technical skills	3.79	20
Flexibility	3.79	21

The skill before automation ranked as follows: Teamwork, Verbal communication, Willingness to learn, Understanding and taking directions for work assignments, Integrity, Customer service skills, ability to design a process to meet desired objectives, Emotional Intelligence, Ability to identify and solve technical problems, Self-motivation, Self-discipline, Ability to analyze and interpret data, Accepting responsibility of actions, Written communication, Ability to use modern tools and

equipment, Creativity, Computer skills, Reliability, Empathy, Technical skills, and Flexibility.

4.2 Skills after automation

The skills after automation ranked according to its importance for employer as follows: Computer skills, Technical skills, Ability to use modern tools and equipment, Ability to design a process to meet desired objectives, Ability to identify and solve technical problems, Willingness to learn, Ability to analyze and interpret data, Integrity, Customer service skills, Reliability, Understanding and taking directions for work assignments, Teamwork, Self-discipline, Emotional Intelligence, Accepting responsibility of actions, Self-motivation, Creativity, Flexibility, Verbal communication, Written communication, Empathy.

Table 2: Skills after automation

skill	Mean	Ranking
Computer skills	4.27	1
Technical skills	4.23	2
Ability to use modern tools and equipments	4.19	3
Ability to design a process to meet desired objectives	4.16	4
Ability to identify and solve technical problems	4.15	5
Willingness to learn	4.13	6
Ability to analyze and interpret data	4.12	7
Integrity	4.11	8
Customer service skills	4.09	9
Reliability	4.07	10
Understanding and taking directions for work assignments	4.04	11
Teamwork	4.03	12
Self-discipline	4.02	13
Emotional Intelligence	4.00	14
Accepting responsibility of actions	3.99	15
Self-motivation	3.98	16
Creativity	3.94	17
Flexibility	3.87	18
Verbal communication	3.84	19
Written communication	3.83	20
Empathy	3.67	21

5. CONCLUSION

This research included 21 skills before automation and after automation. These skills are flexibility, creativity, empathy, reliability, integrity, self-discipline, self-motivation, teamwork, willingness to learn, understanding and taking directions for work assignments, accepting responsibility of actions, ability to use modem tools and equipment, ability to identify and solve technical problems, ability to design a process to meet desired objectives, ability to analyze and interpret data, written communication, verbal communication, computer skills, technical skills, customer service skills, and emotional intelligence. The result shows that the mean for the skills after automation is higher than before automation which indicates the importance of the skills after automation.

6. REFERENCES

[1] Winterberg S., Lemos M. (2017). Automation: A Framework for a Sustainable Transition. BSR report 1. Autor, D. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation. Journal Of Economic Perspectives, 29(3), 3-30. DOI: 10.1257/jep.29.3.3.

[2] Hee Chang J., Huynh P. (2016). Asean in Transformation: The Future of Jobs at Risk of Automation. Bureau for Employers' Activities, Working Paper (9), International Labour Organization.

[3] Parasuraman, J., & Prasad, H. (2015). Acquisition of Corporate Employability Skills: A Study with Reference to Engineering Graduates. The IUP Journal of Soft Skills.

[4] Ramady, M.A. 2010. The Saudi Arabian economy: Policies, achievements, and challenges. New York: Springer.

[5] Tan, A. Y. T., Chew, E., & Kalavally, V. (2017). The expectations gap for engineering field in Malaysia in the 21st century. On The Horizon, 25(2), 131–138

[6] Ramaswamy K V. (2018). Technological Change, Automation and Employment: A Short Review of Theory and Evidence. Indira Gandhi Institute of Development Research, Mumbai.

[7] Winterberg S., Lemos M. (2017). Automation: A Framework for a Sustainable Transition. BSR report.

[8] OECD. (2002). Definition and Selection of Competencies (DeSeCo) Theoretical and Conceptual Foundations: Strategy Paper. Organization for Economic Co-operation and Development.

[9] Gowsalya G., Kumar M. (2015). Employability Skill: A Literature Review. International Journal of Advance Research in Computer Science and Management Studies, 3(3).

[10] Zaharim A., Yusoff Y.M, Mohamed A., Omar M., Muhamad N., Mustapha R. (2010). Practical framework of employability skills for engineering graduate in Malaysia. IEEE EDUCON 2010 Conference, Madrid.

