



## FACTORS AFFECTING QUALIFICATIONS GAP FOR NETWORK TECHNICIANS: BAGHDAD UNIVERSITIES CASE STUDY

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**Abstract-** Generally, qualifications for personnel who work in IT field and network operators in particular are considered for many purposes, includes: measuring whether a specific employee capable to handle a certain job or not and it can be made as a direction in order to develop human resources. Whereas, the qualifications are different based on the needs of organizations and views. Furthermore, several influence factors for qualifications in the literature revealed have been employed for industry and academia domains such as, skill, knowledge, ability, attitude, certification, education, and experience. However, few studies have been investigated the impact of the qualifications gap for the previous elements especially inside public universities. On other hand, many studies have determined the values for each of the certification, education, and experience as qualifications for IT personnel. In this paper, conduct a new model to measure the influence for each of Certification Lack (CL), Education Lack (EL1), and Experience Lack (EL2) on the qualifications gap for network technicians inside Baghdad public universities. Data have collected by on-line survey from seventy respondents in order to analyze and test empirically the proposed hypotheses. Education Lack is the highest influencer of qualifications gap followed by Experience Lack, and Certification Lack are the findings of the proposed model.

**Keywords:** Network technician; Qualifications gap; Certification Lack; Education Lack; Experience Lack.

### I. INTRODUCTION

Managing a network includes making changes as the network grows to carry more traffic or reach more users, and troubleshooting the network when things go wrong or performance isn't as desired. Configuring and managing devices continues to be challenging network state changes continually, and operators must manually adjust network configuration in response to changing network conditions [1]. In target to provide a smooth network management, several issues should consider which they becoming increasingly important regarding to the personnel roles as a significant factors in process of network managing, these issues are who can operate the network at lowest cost, guarantee highest quality of services, provide services that cope with customer satisfaction [2]. Network management involves not just technology, but also a human dimension-how people use management tools and management technology to achieve a given purpose, and how people who perform management functions and who are ultimately responsible for the fact that networks and networking services are running smoothly can best be supported. According to human roles in the network management staff must have qualifications that guarantees functionality the network professionally. So, any lack in their skills definitely will affect the whole process of the network management. Employers often assume that certified employees are better able to manage the organization of Information System (IS) resources [3]. For example, "Many employers assume a certified network professional is better able to manage networked resources than is a non-certified counterpart" [4]. The productive potential of employees varies through differences in types and levels of the acquired knowledge, Skill and Ability (KSA). Although jobs are most often defined in terms of tasks, duties, elements, responsibilities, or

behaviors that are necessary to obtain the goal of an organization, they have also been characterized by the KSAs that are inferred as necessary to perform the required behaviors [5]. In [6] authors realized that Human Resources (HR) Managers are often the gatekeepers to the organization, which examined the perceptions of HR managers in relation to education, experience, and IS certification. In this paper, aims to determine the factors that affect qualifications gap for network technicians as part of IT community. In addition, to measure casual relation between independent variables and dependent variables. The main contributions of this paper are: define the qualifications gap according to define the lack in each of education, experience, and certification for network technicians inside public Baghdad universities as case study, and to measure the relationship between the qualifications gap and education lack, experience lack, and certification lack. The rest of the paper is organized as follows: In Section2, introduce the previous works, Section3, discuss research methodology, Section4 present the results discussion of the study which includes four subsections: Descriptive Analysis, Reliability Analysis, and Regression Results. Finally, Section5, conclude the outcomes of the study.

## II. PREVIOUS WORKS

Authors and researchers have been proposed several factors such as knowledge, skill, ability, education, experience, and certification that used as indicators to decide if a certain IT personnel is qualified or not in order to, handle specific career in the network management domain in both of education and industry fields to, avoid the lacks of their qualifications. Qualifications have been used for hiring and measuring IT personnel capabilities to perform corresponding duties that provided via certain metrics that have presented by several academic works. Based on previous studies, we try to cover several factors that have used as an indicators for measuring the qualified IT personnel. According to [7] found the shortage of qualified professionals came not from a lack of applicants but rather a lack of individuals with adequate skills, They attributed part of the reason to emphasis on short training and certification programs at the expense of university education. In [8] have examined the importance of each of education, certification, and experience in order to, make hiring decision by IT managers. This study have shown the values and benefits for previous factors and the relation between them. As well as, they are inadequate substitutes for each other and by doing several repeated measure analysis. Furthermore, the authors have found any increasing in formal education is supported by decreasing stress on experience until balance was gotten. In addition to, they have showed in case these factors have value for IT certification what are the benefits that we can get [8] As well as, [7] Authors presented what are the factors needed to focus by computer programmer in order to, reduce the shortage of skills. These factors are, knowledge, Skills, and Abilities (KSAs) that needed by one group of information technology (IT) personnel - the computer programmer. As well, illustrated the most important Qualification factors needed to IT professionals who have experience in the programming arena that are an eclectic mix of skills. Of the three skill categories -technical, soft skills, and business concepts - technical and soft skills. In addition, human skill achievements such as Knowledge, Skill and Attitude (KSA) discussed by [8] that referred to the capability of the technical staff in public universities. This study identified the capital equipment management benchmarking in Malaysian public universities specifically. Therefore, it be a suitable trend to measure the capability of human factors through KSA as apart from Human Resource Development aspect. The findings resulted to develop Overall Equipment Efficiency Model (OEEM) in order to, measure the productivity of the technical skill performance among technicians in the engineering lab based on KSA factors. On the other hand, many IT professionals believed that managers used IT certifications as an indicator selection tool when hiring as well, they considered them as a signal to hiring managers that a job candidate has achieved a level of knowledge and skill necessary to perform in a particular IT job role ([9],[10]). Hence, Employers have been turned to get certain computer certifications increasingly, in order to possess the necessary skills, make it as a condition of employment, to be able to manage the organization's IS resources, and assumed a certified network professional is better able to manage networked resources than is a non-certified counterpart for many employers ([3],[4],[10], [11]). In addition to, managers usually used a

several benchmarks as an indicators to decide whether an employee is qualified or not through hiring, include, certification to screen applicants, to differentiate between otherwise equally qualified applicants, to qualify for service-agreement discounts and warranty protection, and to validate their employees' qualifications to their own customers [12]. In [6] authors presented a study that examined the perceptions of Human Resource (HR) managers in relation to education, experience, and Information System (IS) certification, and they conclude that certification, education, and experience are imperfect substitutes for each other. Thus, each component exerts its own unique positive influence on HR managers' perception formation. On the other hand, HR managers believed that certified professionals used certification as a means of securing new career opportunities outside of their present places of employment. Whilst, certified professionals who seem to associate certification benefits with improving the quality of work life at their present place of employment[6]. Several researchers conducted an exploratory studies to examine the job qualifications factors for IT positions especially in terms of, certifications, experience, and education such as[13] that presented quantitative study reporting on whether a select group of companies are looking for a bachelor's degree for job consideration in this field or looking more for experience and certification, as well as,[18] discussed The values of an individual within any organization is influenced by various factors to include formal education, certifications and peer respect. Likewise, [14] conclude that "In totality, we find that experienced IT professionals performed better than novices by providing a significantly larger repertoire of responses, taking significantly less time in generating this larger repertoire, and providing response that were of significantly higher quality". Whilst, [15] produced a quantitative study that reported on whether a randomly selected group of top 100 companies is looking for a bachelor's degree for job consideration and looking more for experience and certification. The study examined the job qualifications in 2012 for computing positions advertised by 100 companies as found in the "Best Places to Work in IT" according to Computerworld, and the findings suggest two percent of the openings required a Master's degree. Bachelor's degrees are required for nearly 70 percent of the jobs, and experience is almost universally specified in job announcements. In addition to [16] conducted a comprehensive model using third-party survey data to estimate the values of various IT certifications in terms of, their contributions to IT professionals' wages. The findings for the proposed model are, 1) IT certifications are valuable in general; 2) there is a substitution effect between IT certifications and education and between IT certifications and experience; and 3) the value of IT certifications are job and industry specific.

### III. METHODOLOGY

This research is finding factors that influencing significantly to qualifications gap for IT personnel (network technicians) inside public Baghdad universities. Identification of the factors that become hypotheses define from the literature, papers, and discussion forums to conduct a model of this research. Then, research model is proved empirically in the form of hypothesis testing with the data that have been obtained from the questionnaire. As mentioned in introduction section, there are several factors that considered in order to, evaluate and measured the ability of the applicant for handle certain job inside IT community. Those factors as follows: skill, knowledge, ability, attitude, education, certification, and experience. In order to determine what is the most qualification that have missed by network technicians inside public universities of Baghdad so the main focus of the current study is measuring the influence of lacking in Certification, Education, and Experience on the qualifications gap. As show in Figure1.

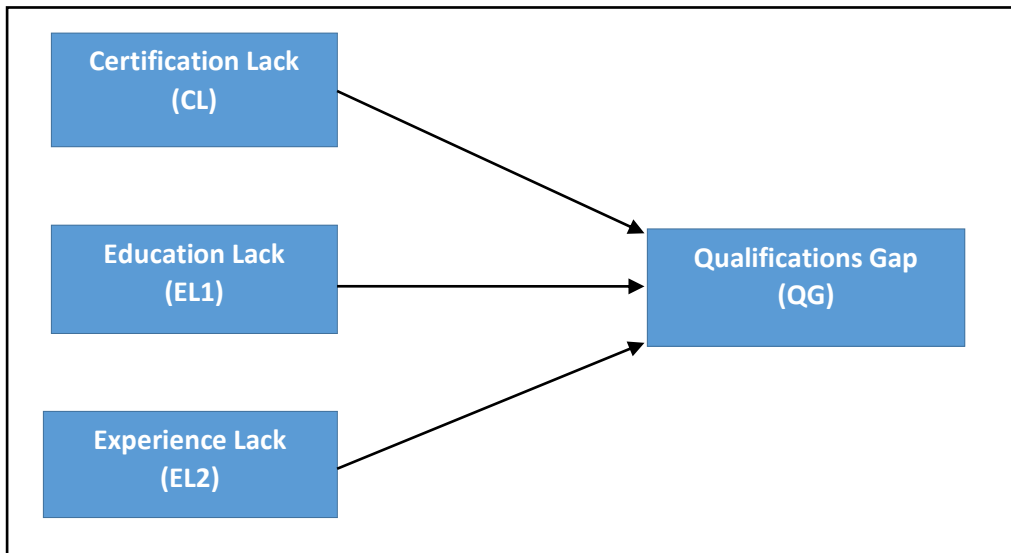


Figure 1. Model for Qualifications Gap for Network Technicians

factors that have measured and presented from previous studies, after proving the value of these factors, this study try to measure this value but with opposite view by assuming there are lack with previous three factors and in the same time qualifications gap. Furthermore, measuring the influence of lacking for each factor on the qualifications gap. The propose model based on several steps in other word model bases have developed as follows:

- Lack of studies qualifications gap for network technicians inside public universities.
- Identify factors that indicate qualifications for IT personnel (network technician).
- Develop the hypotheses that reflect the influence between variables.
- Identify qualifications gap of technicians for network management inside Baghdad Universities (Survey).
- The proposed factors were found significantly influence qualifications gap.
- Propose Model.
- Evaluation by Experts.
- Finalized Model.

The measurement for these conceptual or latent variables was based on a five-point Likert scale with scale anchors from “1” – strongly disagree to “5” – strongly agree. This study takes a population of people who works in public universities of Baghdad specifically as network technicians and generally related with networking field or IT field. These universities include University of Technology, University of Baghdad, Al-Mustansiriya University, and Al-Iraqia University. The instrument that used for data collection in this study is questionnaires. Questionnaires are a series of questions where respondents fill in the answers to the alternative approach of their answers. Questionnaire was given to respondents who were sampled from the study population. Questionnaires were conducted via electronic media ([www.docs.google.com](http://www.docs.google.com)) as well as through the paper. The statistical method used to find out the relationship between the variables that affect Qualification gap is as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \dots + \beta_9X_9 + \varepsilon$$

Where:

Y = qualifications gap,

$\alpha$  = regression constant,

$\beta_1, \beta_2, \beta_3, \dots, \beta_9$  = regression coefficient,

X1, X2, X3, ..., X9 = independent variables (based on research variable),

$\varepsilon$  = error term.

Then to model the relationship between qualifications gap and independents variables we use the following regression model:

$$Z = \alpha + \beta_1 Y + \epsilon.$$

Furthermore, estimators of  $\beta_1, \beta_2, \beta_3 \dots \beta_9$  (regression coefficient) and the CFA were computed using the statistical package SPSS-Amos version 21 and version 20.

The hypotheses for the study are as follows:

H1: Certification lack has significant influence on the qualifications gap.

H2: Education lack has significant influence on the qualifications gap.

H3: Experience lack has significant influence on the qualifications gap.

## IV. RESULTS DISCUSSION

### 4.1 Descriptive Analysis

Among the 70 respondents there were 54 (77.1 %) males and 16 (22.1%) females the majority 30% of respondents in the university group is from the University of Baghdad. This is followed by 27.1% of respondents from Al-Iraqia University, 20% of respondents from Al-Mustansiriya University, 22.9% of respondent from University of Technology, It is can be concluded there is a significant responding for the questionnaire from the respondents of four Baghdad public universities.

### 4.2 Reliability Analysis

Reliability testing using Cronbach's Alpha was conducted on most variables in order to measure the interreliability. According to [17] an instrument has an acceptable level of reliability when Cronbach's Alpha is greater than 0.70. From 3 research variables can be seen that all the variables have Cronbach's Alpha coefficients over 0.70 so it can be used for this research.

### 4.3 Regression Results

This research has developed three main hypotheses. These hypotheses are related to the influence for each certification lack, education lack, and experience lack on qualifications gap. Table 1 shows the results of the regression analysis. In this study, the findings show that the P-value of the variables of this study are less than 0.05 which indicates that all the proposed hypotheses were accepted. Regression analysis is valuable for testing the hypotheses. The hypotheses of this research are casual because they are interested to find the influence of one independent variable on the dependent variable. In [19] pointed out that in order to test the causal relationship, regression analysis with unstandardized coefficient (Beta). The Unstandardized coefficient (Beta) is used to test the hypotheses because it measures the influence between the independent variables and the dependent variables. In addition, the P-value indicates whether the hypothesis is significant or insignificant. If the P-value is less than 0.05, it indicates that the hypothesis is significant and supported [19].

Table 1. Regression Analysis

Variables	Unstandardized Coefficients (B)	Sig. (P-value)
CL	.398	.001
EL1	.651	.000
EL2	.469	.000

Based on the finding in Table 1, Certification lack significantly influences qualifications gap ( $B = .398$ ,  $P\text{-value} = .001$ ). The influence is significant because the  $p$ -value is less than 0.05. Thus, H1 is supported. The finding in Table 1 shows that there is a positive influence of Education lack on qualifications gap. The coefficient ( $B = .651$ ,  $P\text{-value} = .000$ ) shows that the influence is significant because the  $p$ -value is less than 0.05. Thus, H2 is supported. The finding in Table 1 shows that there is a positive influence of Experience lack on qualifications gap. The coefficient ( $B = .469$ ,  $P\text{-value} = .000$ ) shows that the influence is significant because the  $p$ -value is less than 0.05. Thus, H3 is supported. Among three factors we can conclude the biggest influence on the qualification gap is education lack.

## V. CONCLUSIONS

Recently, human involvements have been played an important role in maintain and keep network running smoothly. Network operator faced diverse rules in terms of network management such as security issues, performance, maintenance, monitoring and so on. From the results it could be concluded that the factors below in order of the greatest contribution to influence on qualifications gap for network technicians under the IT personnel community: certification lack, education lack, and experience lack. From this research, factors significantly affect qualifications gap. The highest influencing factor is education lack followed by experience lack and certification lack. The proposed model could help decision makers inside public universities of Iraq to utilize these factors to enhance the level of handling jobs by workers especially networking domains and generally in IT field. Also could use in order to hiring a new staff in the future in order to avoid the qualifications gap form the first place. Finally, even the proposed model can be used by the workers themselves in order to focus on which of three factors they have lack. Thus, workers can avoid the qualifications gap and can handle their jobs in systematic and professional approach. As a part of the future plan, intend to develop the proposed model to include more factors that should consider for network technicians inside public universities in Iraq. Thus, more universities and samples will consider for future researchers.

## REFERENCES

- [1] H. Kim and N. Feamster, "Improving Network Management with Software Defined Networking," no. February, pp. 114–119, 2013.
- [2] A. Clemm, *Network Management Fundamentals Corporate and Government Sales*. Indianapolis, 2007.
- [3] C. G. Cegielski, "Who values technology certification?," *Commun. ACM*, vol. 47, no. 10, p. 103, 2004.
- [4] C. G. Cegielski, C. M. Rebman, and B. J. Reithel, "The value of certification: An empirical assessment of the perceptions of end-users of local area networks," *Inf. Syst. J.*, vol. 13, no. 1, pp. 97–107, 2003.
- [5] H. G. Kaufman, "Relations of ability and interest to currency of professional knowledge among engineers," *J. Appl. Psychol.*, vol. 56, no. 6, pp. 495–499, 1972.
- [6] J. E. Anderson and K. S. Barrett, "Information Systems Certification:the Perspective of the Human Resource Manager," *Eighth Am. Conf. Inf. Syst.*, pp. 2134–2142, 2002.
- [7] J. Bailey and G. Stefaniak, "Industry perceptions of the knowledge, skills, and abilities needed by computer programmers," ... *2001 ACM SIGCPR Conf. Comput. ....*, pp. 93–99, 2001.
- [8] S. Hunsinger and M. Smith, "Factors that influence information systems undergraduates to pursue IT certification," *J. Inf. Technol. ....*, vol. 7, pp. 247–265, 2008.
- [9] M. H. Randall and C. J. Zirkle, "Information technology student-based certification in formal education settings: Who benefits and what is needed," *J. Inf. Technol. Educ.*, vol. 4, pp. 287–306, 2005.
- [10] A. Al-rawi, A. Lansari, and F. Bouslama, "A Holistic Approach to Develop IS Curricula : Focusing on Accreditation and IT Certification," *J. Inf. Technol. Educ.*, vol. 4, 2005.

- [11] L. Hitchcock, "Industry certification and academic degrees," *Proc. 2007 ACM SIGMIS CPR Conf. Comput. Pers. Res. Glob. Inf. Technol. Work.*, pp. 95–100, 2007.
- [12] D. S. Hunsinger and M. a Smith, "Predicting hiring managers' intentions to use I.T. certification in the selection process," *J. Inf. Technol. Manag.*, vol. XVI, no. 4, pp. 1–18, 2005.
- [13] G. J. Robin, "Do companies look for education , certifications or experience : A quantitative analysis current industry needs/requirements," *Sigmis-Cpr*, pp. 1–5, 2011.
- [14] D. Joseph, S. Ang, R. H. L. Chang, and S. a. Slaughter, "Practical intelligence in IT: Assessing soft skills of IT professionals," *Commun. ACM*, vol. 53, no. 2, pp. 149–154, 2010.
- [15] G. J. Robin and R. F. Roggio, "A Quantitative Analysis of Computing Jobs in 2012," pp. 1–8, 2012.
- [16] S. D. Quan, jim J and Dattero, Ronald and Galup, "Information Technology Wages and the Value of Certifications:A Human Capital Perspective," *Commun. Assoication Inf. Syst.*, vol. 19, no. 6, 2007.
- [17] U. Sekaran, *Research Method for Business; A Skill Building Approach*. 2003.
- [18] T.Hoyle,Credentials for success:an evolution in the IT industry.T&D July,pp.48-51, 2010.
- [19] Z.Awang,Handbook on Structural Equation Modeling .Kuala Lumpur,Malaysia, 2014.