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Investigation of employers' performance expectations for new IT graduates in individual and team work settings for software development

Abstract

Purpose: In general, software development work environments involve many different tasks and have high demands on efficiency and quality of performance at both individual and team levels, which depend on the competencies of employees. However, the literature does not provide satisfactory evidence as for the characteristics and competencies of individuals. Especially, the employers' expectations of new graduates have not been investigated in detail for different work environments. This study aims to examine employers' expectancies regarding technical, personal and educational competencies among IT-graduated employees to provide a comparison between individual and team work settings.

Design/methodology/approach: A survey approach was used for this purpose and the research model was tested using multiple regression.

Findings: The results revealed that significant diversity exists in individual and team work settings regarding employers' expectations for new graduates' competencies in terms of adapting to new software development methods and approaches, using time effectively and experience gained in undergraduate projects.

Originality/value: The results of this study will yield insight to computer-related departments in curriculum development by providing a comparison between the varying competencies required in individual and teamwork settings from the employer's perspective. In the long run, the aim is to meet employers' demands of the new graduates' competencies, resulting in better individual and team performances in IT companies, thereby leading to successful software development.

Keywords: competences, IS professionals, skills, soft skills, work performance

Introduction

The education provided by computer-related departments such as computer engineering, software engineering, computer science, informatics, etc. aim to equip graduates with specific skills and competencies, which do not often conform with the capabilities required by the computer industry. The dynamic and complex conditions encountered in the workplace of computer and software companies are not always fulfilled by the new graduates' qualifications, leading to failures in software development and, consequently, dissatisfaction among employers. (Andrews and Higson, 2008; Turhan and Akman, 2013).

The success of software projects developed in Information Technology (IT) and Information and Communication Technology (ICT) companies largely depend on the success of the individuals and teams who take part in the software development process (Acuña *et al.*, 2015) [1]. Even though the software development process is mainly considered to be a team activity along with the collaboration, coordination and conflicts among the team, the individual performance of the team members also contribute to the success of the project at hand (Balamohan *et al.*, 2015; Bender *et al.*, 2014). Software project managers demand different competencies from graduates when they need to work independently; this is in contrast to when they are expected to work as a team member. The attitude, behaviour and performance of new graduates tend to vary in individual and team work settings, depending on their technical competencies, personal skills and educational background. There have been numerous studies on the technical/hard and non-technical/soft skills that graduates are expected to possess (Andrews and Higson, 2008; Selvadurai *et al.*,

2012); yet, the employers' perceptions of how these skills affect the performance of the employee when working individually vs. in a team has not been investigated fully.

The employability of graduates have been previously examined in a number of studies from different perspectives. For example, in their studies, Kiffin-Petersen and Cordery (2003) examine employee attitudes towards teamwork; Andrews and Higson (2008) perform an exploratory study investigating the viewpoints of graduates and employers in four European countries; Selvadurai et al. (2012) study the required generic skills of graduates from employer's perspectives; DuPre and Williams (2011) examine undergraduates' perceptions regarding the expectations of their prospective employers; Balamohan et al. (2015) investigate the role of emotional intelligence on individual performance, leadership and team-effectiveness; Lau et al. (2016) explores the expectations regarding the IT skills for Vietnam; Malik and Venkatraman (2017) compare the employer expectations with the employee skills in India; Ramadi et al. (2016) analyze the gap between the managers' expectations and satisfaction in engineering in the MENA region and, lastly, Costa et al. (2014) present a model for teamwork engagement. Additionally, the Accreditation Board for Engineering and Technology (ABET) gives higher emphasis to professional competencies (Turhan and Akman, 2013; Shuman *et al.*, 2005) than curricular course details since they are nearly standard in almost all IT departments. Furthermore, Mukhtar et al. (2009) and Pool and Sewell (2007) also pointed out the changing nature of competencies and, therefore, the need for further research for a better chance of occupational satisfaction and success (Turhan and Akman, 2013).

This study aims to examine employers' expectations regarding the technical, personal and educational competencies of IT graduated employees so as to create a comparison between individual and teamwork settings. The authors believe that the results of this study will yield much needed insight into IT departments since the differences between the varying demands of individual vs. team environments are yet to be considered thoroughly in curriculum development. Accreditation bodies such as ABET, ENAEE, and others clearly distinguish the ability to function effectively as an individual and as a team member in their program outcomes; but without providing details as to which competencies must be included in a curriculum to attain these goals. As such, the feedback presented in this study given from the employer's perspective, is expected to assist IT departments in equipping their graduates with competencies and skills that fulfill the demands of the computer industry in terms of individual and teamwork performance and in line with the requirements set forth by accreditation establishments.

Theoretical development

The quantitative indicators of individual and team work settings have been investigated in the literature from different perspectives since they are considered to be important in justifying the expectations regarding employability and employees' performance (Lee and Brand, 2005). According to Schaubroeck et al. (2007) teamwork performance is a function of each member's individual performance. Furthermore, Lee and Brand (2005) examine the effects of personal control over the work environment on perceived job performance, job satisfaction, group cohesiveness and inclinations to work alone or in a team. They also state that organizational performance can be related to individual and team work settings. Imran, et al. (2012) support this view by highlighting work settings to be a mediating factor in job performance. These mean individual and team work settings involve different work outcomes with different levels of productivity (Sundstrom, 1986). Such differences can be attributed to methodological and technological improvements (Lee and Brand, 2015) and could have important consequences for establishment's approaches towards motivations,

expectations and employment policies (Cuyper *et al.*, 2011). This also means employer's priorities regarding work settings and corresponding expectations may vary depending on the field of work. Most of the available studies focus on employers' expectations using traditional indicators (De Vos and De Hauw, 2010) and do not consider the nature of relationships between competencies and work settings. The 'ability to work in different settings' has for long been a key competence, especially for Information Systems (IS) engineers from the employer's perspective (Figl, 2010). In spite of this, employers' perceptions on competencies of their IT employees from this perspective have not been studied yet. With all this in mind, the present study attempts to focus on employers' performance expectations about competencies for their IT-graduated employees in different work settings. Additionally, the characteristics of different work settings tend to be left out when developing curricula by academics. For this reason, such a study can be a valuable reference for curriculum designers since it is reported that universities should do their best for their students to gain previous experience in individual and team work settings (Holker, 2012).

To be in line with the existing literature, the competencies were grouped in three categories: technical (SD-processes ($i=1$), SD-methods ($i=2$) and SD_solutions ($i=3$)), personal (time ($i=1$), leadership ($i=2$) and communication ($i=3$)) and educational (language ($i=1$), project ($i=2$) and accreditation ($i=3$)). As it is also the case in many of the empirical research, fragmentation is used to avoid complications in this study. See Figure 1 for detail. In the following, each category is discussed further.

--- Figure 1 near here ---

Technical competencies

Technical competency is defined as the ability to choose and apply an integrated combination of knowledge with the intention to realise a task in a certain context (Kouwenhoven, 2003). A number of studies have addressed the relationships between technical competencies and employer's expectations. Some of the research on student-learning outcomes show that developing technical competencies during undergraduate education is perceived to be a vital element for employability in the industry (Nair *et al.*, 2009). Kouwenhoven (2003) is in favor of this view by stating that there is a high demand for problem-solving skills in the industry. Generally, employers expect adequacies in problem solving and application so that the systems being developed work efficiently and effectively (Nair *et al.*, 2009). In his study, Coates (2007) also supports the importance of knowledge and competencies regarding current techniques, methods and procedures in project applications. On the other hand, it is generally known that university graduates are required to work both individually and in team settings (Holker, 2012). In an earlier study, Yorke (2006) reports certain disappointments from the industry regarding the lack of graduates' skills in teamworking. All these can be taken as an indication of the fact that the relationships between technical competencies and employer's expectations for different work settings need to be further understood by curriculum designers. Therefore, the following hypotheses are postulated:

$H1_{i1}$ Perceived technical competency _{i} ($i=1,2,3$) of the new IT graduate has significant influence on employers' expectations in individual work settings.

H1₁₂ Perceived technical competency_i (i=1,2,3) of the new IT graduate has significant influence on employers' expectations in team work settings.

Personal competencies

Personal competencies are amongst the emerging fields in studying employers' expectations since they are assumed to be highly related to the employability of new graduates (Mukhtar *et al.*, 2009; Yorke, 2006). Mukhtar *et al.* (2009) studied the relationship between personal competencies and employability and reported lack of competencies among university graduates in communication, leadership and time management. They also pointed to the need for graduates' to be able to work effectively in different work settings. According to their study, this is especially critical for multi-departmental teams working towards solutions to multidisciplinary problems. This view was supported by Yorke (2006), who indicated the concern of employers with the development of 'generic skills', such as communication, team-working and time-management. Kouwenhoven's study (2003) focused on the characteristics of successful competence-based curriculum development and defined the competent behaviour of graduates resulting from competencies and personal traits. Additionally, there is a need to secure the competence of future graduates in the new economy (Mukhtar *et al.*, 2009), in which case, a systematic analysis of employer's perceptions regarding personal competencies has to be well understood in terms of individual and team work settings. Therefore, the following hypotheses are proposed.

H2₁₁ Perceived personal competency_i (i=1, 2, 3) of the new IT graduate has significant influence on employers' expectations in individual work settings.

H2₁₂ Perceived personal competency_i (i=1, 2, 3) of the new IT graduate has significant influence on employers' expectations in team work settings.

Educational competencies

The skills and knowledge required by the computer industry do not always conform to the technical and personal qualifications of the computing graduates because of the discrepancy between the educational objectives of the computing departments and expectations of the industry throughout the world (Turhan and Akman, 2013). Singh and Singh (2008) also note employers' perceptions as to the importance of involving students in different work settings in course-based and senior-year graduation projects. Additionally, Coates (2007) supports the importance of work setting experiences gained from the applications of undergraduate projects in the employability of graduates. On the other hand, Singh and Singh (2008) have found that proficiency in the English language is amongst the employability skills that were highly deemed important by both the graduates and the employees. This may be an indication of the importance of English as the language of instruction in universities. However, the literature refers to issues concerning the industry expectations and graduates' educational competencies (Juhdi *et al.*, 2010). All these may be used as an indication of the need for more surveys in order to increase the validity of the items used in measuring employability in terms of different work settings. Accordingly, we formulate the following set of hypotheses.

H3₁₁ Perceived educational competency_i (i=1, 2, 3) of new IT graduate has significant influence on employers' expectations in individual work setting.

H3₂ Perceived educational competency_i (i=1, 2, 3) of new IT graduate has significant influence on employers' expectations in team work setting.

General performance expectations

Recently, employability has been studied in terms of employers' General Performance Expectations (GPE) and a close relationship has been reported (Mukhtar *et al.*, 2009; De Vos and De Hauw, 2010; Yorke, 2006). The skills required by the computer industry do not always conform to the qualifications of the computing graduates because of the inconsistency between the objectives of the computing departments and expectations of the industry (Turhan and Akman, 2013). Additionally, there is a general consensus about the importance of the skills needed for the employees' ability to work collaboratively, and the challenge is to determine the curricula required for that purpose (Pender and Looy, 2004; Tse *et al.*, 2006). Most of the time, the new economy requires IT graduates to work in teams since problems to be solved are usually multifaceted and influence the nature of competencies and employability (Mukhtar *et al.*, 2009). On the other hand, there are innumerable instances where a decision is needed to complete a task by one individual working alone or collaboratively by a team (Mumford, 2015). Such a decision should be based on differences in the nature of individual and teamwork settings, as well as the skills of employees; such decisions play a meaningful role in employers' expectations regarding general performances. However, although many scholars underline the importance of using a broader view on this issue, available studies do not directly focus on explaining the relationships between employers' GPE and expectations regarding individual and team work settings. This backdrop leads to the following hypotheses.

H4₁ Employers' expectations for individual work settings have significant influence on the general performance of the new IT graduate.

H4₂ Employers' expectations for team work settings have significant influence on the general performance of new IT graduate.

Research Design

A survey instrument was developed for testing all of the previously mentioned hypotheses. This instrument contains 16 variables grouped in four empirical categories: "technical competencies", "personal competencies", "educational competencies" and "expectations". Each of the first three categories contains three independent variables. The variables representing expectations regarding individual and teamwork performances are dependent variables to competency categories and independent to employers' GPE. The variables, sector, graduation, position and experience are used for descriptive purposes. Table 1 summarizes the definitions, scales, and the range of values for these variables.

--- Table 1 near here ---

The sample of this survey was constituted from IT unit/project managers or senior IT professionals since the purpose of this study is to investigate the factors influencing employer expectations in terms of individual and teamwork settings. The sample size was limited to 110 leading establishments and was selected according to judgement sampling method. While a number of the participants were interviewed face-to-face, most of the responses were collected using e-mail. A total of 81 completed survey questionnaires were received, representing 73.6% response rate. Except descriptive ones, the Five-point Likert

Scale (5=very much, 4=much, 3=moderate, 2=little, 1=very little) was used for collecting data for other variables.

The overall internal reliability as measured by Cronbach alpha was found to be 0.823, meaning that the data is reasonably reliable since 0.7 and above is usually the acceptable threshold (Yu, 2007). Furthermore, factor loadings (Table 1) for empirical categories are in the range of 0.638-0.913 and can be regarded as the presence of construct validity. Also, the high communalities observed for each item reduces the need for a larger sample (MacCallum *et al.*, 1999).

The multiple regression modelling approach was used to extract the nature of the relationships between the dependent and independent variables and the chi-square independence test was also used when needed (Saunders *et al.*, 2009).

Descriptive Results

The descriptive profile of the respondents is provided in Table 2.

--- Table 2 near here ---

Parallel with the purpose of this study, it is observed that most of the respondents' current positions were unit/project manager (84%), and senior IT professionals (16%) (Table 1). In the survey, a majority of the respondents were graduates of IT related departments (57%) and only 37% of this group are working in public-sector establishments. This percentage for graduates from other branches is higher (63%) in the same sector. This is expected since the demand for IT graduates is high in Turkey and the salaries are generally lower in the public-sector organizations than those of their private-sector counterparts. This means that most of the IT graduates prefer working in the private sector, and that the public sector meets its demand with graduates of other fields. The chi-square tests show the dependence in the sector and graduation of the respondents to be statistically meaningful (Chi-Square=10.787; DF=4; P-Value=0.029). Interestingly, of the IT-graduated respondents, 82% are currently working as either unit or project managers and this percentage for respondents from other branches is slightly higher (85%). The reader should note that this difference was not found to be statistically significant (Chi-Square=0.915; DF=2; P-Value=0.633). What's more, most of the public- (72%) and private- (63%) sector respondents find the performance of new IT graduates to be average. The survey results have shown the expectations of IT-graduated respondents to be slightly higher since 80% of this group believe new IT graduates meet employer's expectations at an average level or less. However, the differences between the distributions of respondents' field of graduation and level of expectations was not found to be significant (Chi-Square=2.901; DF=3; P-Value=0.407).

Test Results

The results of the regression tests for the hypotheses are given in Table 3.

As for the technical competencies, the inspection of p-values reveals the following:

- Individual work setting: There is sufficient evidence to accept H1₁₁ and H1₂₁ at 5% significance level. This means, the variables "SD_processes" and "SD_methods" are significantly related to the variable "individual work" at 0.05 significance level. This means, employers believe that the new IT graduates' competencies in software development processes and adopting new software development methods and

approaches are important for individual work environments. The variable “SD_solutions” was not found to have a significant impact on the variable “individual work” in this category and H1₃₁ is rejected. This concludes that organizations do not expect their new employees to devise solutions to problems even in individual work settings. This is probably because organizations expect from this inexperienced group of employees to follow the existing procedures and work instructions only for the sake of achieving the quality standards of work and avoiding potential complications.

- Teamwork setting: The only variable found to be significant at 5% significance level is “SD_processes” in this group and hence we accept H1₁₂. This shows that new IT graduates were expected to adopt software development methods not only in individual work settings but also in team work settings. The test results do not support the hypotheses regarding “SD_methods” and “SD_solutions” and, as such, H1₂₂ and H1₃₂ are rejected. In other words, in team work settings, employers do not expect their new employees to be competent in adopting new software development methods and developing solutions to problems in projects.
- Comparison: Based on the test results, “SD_process” is significant and “SD_solutions” is insignificant for individual and team work settings in this empirical category. The diversity was found only in employer’s competency expectations regarding “SD_methods” since it is found to be significant for individual and insignificant for team work settings.

For the personal competencies, the inspection of p-values in Table 3 indicates that:

- Individual work setting: Surprisingly, the variables “time” and “leadership” are not supported by the survey results. Hence, H2₁₁ and H2₂₁ are both rejected at 5% significance level. This means new IT graduates’ skills in “using time effectively” and “competencies in leadership” are not perceived to be determinants of general work performance in the case of individual work settings. These may be taken as an indication of the fact that organizations do not prefer to focus on individualistic initiatives for their new IT graduated employees. On the other hand, p-value shows significance for H2₃₁ and we accept it. In other words, employers expect new IT graduates to be competent in communication. This shows the importance of “communication skills” for especially effective multi-disciplinary work in individual work settings.
- Teamwork setting: The variables “time” and “communication” have been found significant and, therefore, H2₁₂ and H2₃₂ are both accepted. In other words, effective time usage and communication skills are perceived to be indicators of general work performance in interdependent team environments since behaviours, actions and feelings of individuals affect the whole team. Surprisingly, competency in “leadership” is the only factor not supported by the test results and H2₂₂ is rejected as such. This means, similar to individual work settings, new IT graduates are not expected to show personal initiatives such as leadership. This is probably because, emphasis is given to harmonious relationships between team members and the focus is task accomplishment in team work settings.
- Comparison: Considering the test results in this category, the variables “leadership” and “communication” are found insignificant and significant respectively for individual and team work settings. Regarding employers perceptions, “time” is the

only factor found to have differences since its influence on general work performance is insignificant for individual and significant for team work settings.

For the educational competencies, the inspection of p-values in Table 3 yields the following highlights:

- Individual work setting: Surprisingly, p-values in Table 3 indicate that “projects” and “accreditation” are not significantly related to employer’s expectations regarding educational competencies for individual work performance at 5% significance, and we reject H3₂₁ and H3₃₁. This shows that being involved in projects during undergraduate education and graduation from an accredited IT-related department do not affect employers’ work performance expectations in individual work settings. These may be explained by the facts that individual work does not require project experience for new IT graduates most of the time and awareness on accreditation was observed to be low among employers in this research. However, test results also show significance of “language” and H3₁₁ is accepted in this category. In other words, employers perceive graduation from an IT department whose instruction medium is English to be important for individual work performance. This may be because English is the dominating language in the field of IT.
- Teamwork setting: Interestingly, “language” and “projects” are supported by the survey results and H3₁₂ and H3₂₂ are accepted at 5% significance level. This means being a graduate from an IT department, whose instruction medium is English and whose curriculum includes involvement in projects are perceived to be important by the employer in teamwork settings. A plausible explanation for these results may be based on dominant characteristic of the English language in IT and the advantage of having project experience because teams are generally involved in projects. Similar to individual work settings, the factor “accreditation” does not show any significance in this category and H3₃₂ is rejected. In other words, employers do not consider accreditation of departments as one of the decisive factors in teamwork settings.
- Comparison: Based on the test results, the variable “language” is significant and “accreditation” is insignificant for individual and team work settings in this empirical category. The diversity was found only in employer’s competency expectations regarding “projects” since it is insignificant for individual and significant for team work settings.

Investigation of p-values (Table 3) shows that expectations regarding both the individual (p-val: 0.002) and teamwork (p-val: 0.003) settings have a significant influence on the GPE of employers and H4₁ and H4₂ are accepted. This shows the existence of non-diversity.

--- Table 3 near here ---

Discussion

Since software development is mainly considered to be a team activity (Bender *et al.*, 2014), the success of software projects rely on individual competencies as well as effective teamwork. The team members working on a software project are responsible for interdependent tasks (Acuña *et al.*, 2015) and, in addition to the technical competencies, the personal skills of the team members are key factors that contribute to the collaboration or conflicts within the team, all together affecting the project outcome. The findings in our

study indicate that there are differences in the employers' expectations of the technical and personal competencies as well as the educational background of their IT graduated employees in individual vs. team settings.

The results of the survey presented in the 2015 Job Outlook Report prepared by the National Association of Colleges and Employers (NACE) reveal that employers rate "technical knowledge related to the job" as the sixth most important attribute that the newly graduated employees are expected to possess. Accordingly, our findings also indicate that from the employers' perspective, technical knowledge such as the IT graduates' competencies in software development processes as well as the ability to adapt to new software development methods and approaches has a positive effect on individual performance. Similar to our results, in their study, Hinchliffe and Jolly (2011) have found that at the individual level, employers expect the employees to have the ability to learn new IT systems rapidly and also to be interested in learning and development. Surprisingly, out of the two categories, only the technical background in software development processes was deemed to be important in team settings by the employers. In software development, employers expect all of the team members to be competent in the software methodology being implemented. However, since the team members are able to help each other throughout the project, adapting to a new methodology as a group would not be too difficult and, consequently, this ability is not considered to be essential by the employers.

Interestingly, our findings show that the last technical competency tested which is the employee's ability to devise solutions to problems is not found to be significant by employers at individual or team settings. In parallel with our results, in their study, Selvadurai et al. (2012) also conclude that problem-solving skills are not given as much importance as personal skills by employers. Similarly, Hinchliffe and Jolly (2011) found that employers expect soft skills from their new graduates as soon as they start employment, but that they are willing to wait for one year for the technical skills to develop. In contrast to our findings, Bender et al. (2014) and DuPre and Williams (2011) conclude that employers seek problem-solving and analytical skills from new graduates, just as in the study by Nair et al. (2009) who found that employers view the capacity to analyse and solve problems to be an essential attribute of proficiency. Even though prior literature includes conflicting views on the subject of problem-solving skills of new graduates, we argue that the main factor influencing our findings is that employers do not expect the new graduates to tackle problems as soon as they start working in IT companies; instead, they are expected to spend some time to adapt to their environment, provide support to their colleagues, and follow the directions of their team leaders. Consequently, employers do not consider problem-solving skills to be a necessity for new graduates at the beginning of employment.

Prior literature shows that the personal or soft skills of new graduates are considered to be more important by employers than technical ones, and that they are critical in software development alongside team interrelationships (Acuña *et al.*, 2015; Bender *et al.*, 2014; Ramadi *et al.*, 2016). In our study, the importance of competencies in communication, leadership and time usage were chosen to be analyzed as personal skills required within individual vs. team settings from the employers' perspective. Most importantly, our findings indicate that communication skills are considered to be necessary at both individual and team levels by employers. Similarly, Selvadurai et al. (2012) also show that employers require communication skills from new graduates at the individual level. At the team level, Acuña et al. (2015) explain that personality diversity in teams cause an increase in communication and software development requires a high degree of interaction among members of the team. Consequently, communication skills are helpful during software development and is an

important factor promoting team satisfaction. Additionally, Balamohan et al. (2015) show that team effectiveness depends on cooperation, coordination and inter/intra personal conflicts within the team, where communication skills play a significant role. As such, we argue that the possible reasons for employers giving such importance to their employees' communication skills is that such skills are necessary at the individual level to present ideas clearly in oral or written form, and at the team level, to interact and collaborate with team members for successful software development.

Interestingly, the analysis of the ability to use time effectively showed varying results within both individual and team settings. Our findings indicate that employers feel individuals' timing skills to be not that important, whereas effective time management is crucial once those individuals become team members. Supporting our findings, Bender et al. (2014) also show that one of the most important factors affecting teamwork is time management and similarly, Ramadi et al. (2016) state that employers require the ability to manage time as one of the professional skills a graduate needs to possess. Moreover in their study, Acuña et al. (2015) argue that the influence of a team on the individuals tends to cancel out the individual characteristics of the team members. Having said so, the authors believe that the team's behavior in using time effectively will automatically induce better time management skills on its members. Besides, a plausible explanation for the employers giving more importance to the time management skills in team settings may be that, compared to individual settings, the timing in team settings may produce more complications due to the fact that timing in any form – good or bad - by a team member affects the others as well as the overall timing of the project. However, it is relatively and generally easier for the employers to control and coordinate the timing of employees in individual settings.

Surprisingly, our results indicate that competency in leadership is not found to be important by employers at individual or team settings. This finding conflicts with prior research, such as the 2015 Job Outlook Report which reports that employers rate leadership skills as the topmost attribute sought by employers in new graduates. Similarly, Bender et al. (2014) state that one of the most important factors software development teams depend on is leadership. Yet, ideally the employers would require new graduates to spend a few years and gain experience before getting a chance to practice their leadership skills in the work place. Additionally, many software firms choose to provide in-service training to their new employees to help them gain certain skills required later on (Turhan and Akman, 2013). Therefore, at the time of employment, new graduates' leadership skills would not be a priority for employers, but would be needed in their careers later on.

The third category that has been examined from employers' perspective is the educational background of the new graduates; namely, project experience during their studies, the language of instruction of their university and, lastly, significance of accreditation. First, the results in our study have found that project involvement during undergraduate studies is important for teamworking skills, but does not affect the individual skills of the graduate from the employers' viewpoint. Similarly, in the study by Figl (2010), the integration of developing team competencies and achieving successful team projects in information systems curriculum is examined and the importance of involvement in team projects in the curriculum is emphasized. Accordingly, project involvement during undergraduate studies is the best approach to establish teamworking skills, but is not as important in enhancing the individual skills of the graduate. In order to fulfill the employers' expectations of project experience in higher-education, the authors suggest that undergraduate programs should involve students in various projects in their undergraduate courses, summer practices, senior projects, etc., enabling students to gain experience in the essential skills required in teamwork, such as time management, leadership, communication, etc.

Another result of our study indicates that employers believe English as the chosen language of instruction in a university positively affects the performance of a new graduate at the individual and team level. In a study conducted in Malaysia, Singh and Singh (2008) presented that proficiency in English is a desired employability skill- which may be an indication of the importance of using English as the medium of instruction in universities. As stated previously, employers expect oral and written communication skills from new graduates (DuPre and Williams, 2011; Selvadurai *et al.*, 2012), and establishing effective communication is essential in teams for successful software development (Acuña *et al.*, 2015; Bender *et al.*, 2014). To establish a high degree of interaction in a software company, the employees need to communicate their ideas using the same technical terminology in the same language. Since English is the most widely-used language in the IT world, naturally, employers prefer employees who are already established with the relevant terminology in English in individual and team settings. Furthermore, with the growth of multinational IT companies, the need to be educated in English gains more importance in the eyes of the employers.

As the final analysis in the area of educational background of graduates, employers believe that whether an employee has graduated from an accredited program does not affect the individual or team performance of the new graduate. Even though the accreditation bodies such as ABET, ENAEE emphasize the importance of university-industry collaboration and aim to establish learning outcomes that match the desired employability skills of the graduates (Figl, 2010; Turhan and Akman, 2013), for the most part, the software industry is still not well-informed about accreditation processes, and, therefore does not find it in any way effective in the educational competencies of new graduates. Nonetheless, employers are aware that many computer-related departments follow established guidelines such as ACM/IEEE, SWEBOK, etc. in establishing their undergraduate curricula, or choose to base their curricula on previously-established programs in other universities. In view of this, employers view all computer-related programs equivalently and do not distinguish accredited programs as a required educational background for their new employees.

Lastly, the results of our study indicate that employers' expectations in both individual and team settings have a significant effect on the GPE of the employers. As presented in the study by Costa *et al.* (2014), "team work engagement is positively related with individual work engagement." Individual work engagement relies on job resources and requests, while team work engagement depends on individual's actions as well as inter-member interactions. In another study on individual and group performance, Saad *et al.* (2015) state that a person is an autonomous entity with a unique set of characteristics and backgrounds. Hence, teams are assumed to include an assortment of backgrounds and competencies, leading to a better generation of optimal results and creative solutions. With this background, successful development of software projects which is the general expectation of employers in the IT industry essentially depends on both individual and team competencies of the new graduates.

Conclusion

In this study, differences in employer's expectations regarding new graduates competencies for individual and teamwork settings was investigated. The data were analysed using three empirical categories; namely, technical competency, personal competency and educational background. The analyzed technical competencies include competencies in software development processes, the ability to adapt to new software development methods and approaches, and the ability to devise solutions to problems. The competencies in communication, leadership and time management were analyzed as personal skills, and for

the educational background, project experience during the undergraduate studies, language of instruction of university, and lastly, significance of accreditation were examined for individual vs. team settings from the employers' perspective as well. The competencies in the ability to adapt to new software development methods and approaches, time management and project experience appear to be the only factors that significant difference exists in employers' expectations for individual work and team work settings.

There are limitations to this study as well as suggestions for future research. First, the questionnaire was merely a "snapshot" instead of a longitudinal study. In light of such considerations, future research should also consider the socio-demographic characteristics of employers, organizational culture and other moderating factors into account any and/or all of which can affect employers' expectations. Next, this work can be extended to include expectations of other organizations such as banks, government institutions, universities, etc., whose IT departments may implement or require software development projects. In addition, the differences in employer expectations in different cultures or countries could be further studied. Furthermore, other research methods and techniques such as interviews may provide a more in-depth understanding of the problem and issues. Also the same study could be performed using nonlinear regression. Finally, the sample size can still be increased nationally, even expanded internationally to improve the findings of the study.

Hopefully, the results of this study will yield insight to computer-related departments for curriculum development by providing a comparison between the varying competencies required in individual and teamwork settings from the employer's perspective. Eventually, the aim is to fulfill employers' expectations of the new graduates' qualifications, resulting in better individual and team performances, thereby leading to successful software development in IT companies.

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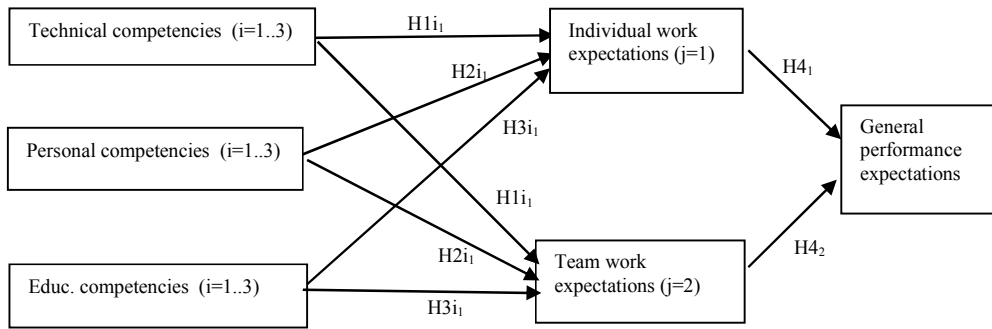


Figure 1. Research Model

Table 1. Summary of Research Questions and Variables

Quest.	Empirical category	Variable	Definition	Range of values	Factor loadings
	descriptive				
1		sector	Sector of respondent's establishment	public/private	-
2		graduation	Respondent's field of graduation	IT related, others	-
3		position	Position of respondent	unit/project man., senior professional	-
4		experience	Years of experience in management	<6, 6-10, 11-15, 15-20, >20	-
	work settings				
5		individual_work (j=1)	How important is the individual working performance of new IT graduates in your organization?	very much, much, average, little, very little	0.913
6		team_work (j=2)	How important is the teamworking performance of new IT graduates in your organization?	very much, much, average, little, very little	0.868
	technical competency				
7		SD-processes (i=1)	Are new IT graduates in your organization competent in software development processes?	very much, much, average, little, very little	0.823
8		SD_methods (i=2)	Are new IT graduates in your organization competent in adapting to new software development methods and approaches?	very much, much, average, little, very little	0.725
9		SD_solutions (i=3)	Are new IT graduates in your organization competent in devising solutions to problems?	very much, much, average, little, very little	0.806
	personal competency				
10		time (i=1)	Do new IT graduates in your organization use time effectively?	very much, much, average, little, very little	0.805
11		leadership (i=2)	Are new IT graduates in your organization competent in leadership?	very much, much, average, little, very little	0.745
12		commun. (i=3)	Are new IT graduates in your organization competent in communication?	very much, much, average,	0.655

				little, very little	
	educational competency				
13		language (i=1)	How important is it for your organization that the new IT employees be graduates from a university whose instruction medium is English?	very much, much, average, little, very little	0.638
14		Projects (i=2)	How important is it for your organization that the new graduated IT employees worked in a project during their undergraduate education?	very much, much, average, little, very little	0.816
15		accredit. (i=3)	How important is it for your organization that the new graduated IT employees graduated from a department accredited by institutions such as MUDEK, ABET?	very much, much, average, little, very little	0.701
	General performance expectations				
16		GPE	To what extent do the newly graduated personnel satisfy your organization's performance expectations?	very much, much, average, little, very little	0.777

Table 2. Descriptive Results

Variable	Respondents	
	Number	%
Respondent's Sector	81	100
public	28	35
private	52	64
unknown	1	1
Respondent's graduation	81	100
IT	46	57
engineering	14	17
others	20	25
unknown	1	1
Respondent's current position	81	100
unit manager/project manager	68	84
senior professional	13	16
Respondent's management experience	81	100
<6	21	26
6-10	17	21
11-15	24	30
15-20	10	12
>20	7	9
Unknown	2	2
Organization's satisfaction from new graduates	81	100
very high	1	1
high	12	15
average	53	65
little	9	11
very little	4	5
unknown	2	3

Table 3: Test Results

Empirical factor	Test variables	Individual work (IW)			Teamwork (TW)			Diversity
		Hyp.	Coeff.	p-val.*	Hyp.	Coeff.	p-val.*	
Technical competencies	SD-processes	H1 ₁₁	0.287	0.022*	H1 ₁₂	0.236	0.041*	no diversity
	SD_methods	H1 ₂₁	0.351	0.008*	H1 ₂₂	0.111	0.397	diversity
	SD_solutions	H1 ₃₁	0.202	0.119	H1 ₃₂	0.128	0.323	no diversity
Personal competencies	time	H2 ₁₁	0.196	0.170	H2 ₁₂	0.274	0.041*	diversity
	leadership	H2 ₂₁	0.249	0.066	H2 ₂₂	0.058	0.641	no diversity
	communication	H2 ₃₁	0.275	0.050*	H2 ₃₂	0.338	0.010*	no diversity
Education. competencies	language	H3 ₁₁	0.149	0.048*	H3 ₁₂	0.313	0.002*	no diversity
	projects	H3 ₂₁	0.022	0.753	H3 ₂₂	0.131	0.042*	diversity
	accreditation	H3 ₃₁	0.018	0.493	H3 ₃₂	0.047	0.081	no diversity
Work Environment	GPE	H4 ₁	0.353	0.002*	H4 ₂	0.373	0.003*	no diversity

*indicates statistically significant at 5 percent significance level.