



ASSESSING PERSONALITY TYPES PREFERENCES AMONGST SOFTWARE DEVELOPERS: A CASE OF MALAYSIA

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ABSTRACT

This paper aims to present personality types preferences among software developers in Northern region of Malaysia. Knowledge in human factor personality types is significant in order to assist project manager for making decision on the right personality types that suit into job tasks assigned to software developers. In addition, there is growing awareness on applying agile methodology during software development. This software methodology claimed to be acknowledged human weaknesses and strengths and thus, has great potential in improving software development effectiveness. Therefore, this study also seeks to compare personality type's preferences amongst agile and non-agile software developers. A questionnaire that includes personality test questions was distributed amongst 81 software developers that working in the software industry. Results demonstrated that the software developers are mostly Introvert (I) personality types. Furthermore, the dimensions of Intuitive (N), Thinking (T), and Judging (J) are dominant personality types among software developers regardless of software methodology used. This study provides an insight into personality type's preferences that can guide human resource manager to select the suitable candidate for specific tasks in order to improve team performance. Future studies will be carried out to collect more empirical data and to build software team personality types composition model.

Keywords: software developer, personality types, agile methodology, human factors, team performance.

INTRODUCTION

Software engineering (SE) is a complex activity, the success of which is highly dependent on both human characteristics of the development team as well as technological issues. It is evident that the success of a team depends on grouping the right people in a team (da Silva et al., 2013), (Gorla, Chiravuri, and Meso, 2013), (Gorla and Lam, 2004), (Sommerville, 2007). Literature review indicates that researchers focusing on teamwork in SE are coming to realize the importance of human factors in influencing software team performance. However, most extant findings reported in the literature failed to incorporate software methodology applied by the team with the personality types suited in the team.

Due to rapid demand of technological changes, agile methodologies have emerged to alleviate the uncertainty of business requirements. The need to deliver quality software in a timely manner and at economical cost is the main issue in software industry. Agile methodology was designed to capitalize on human aspects of software development process by improving communication between developers and manager. This approach has been proven to promote good teamwork, which is one of the key ingredients in developing high quality software (Dingsoyr and Dyba, 2012), (Strode, Huff, Hope, and Link, 2012).

The applications of personality types have been extensively reported in literature review. The literature review revealed studies on the role of personality type in affecting group processes and decision making (Karn and Cowling, 2006), student career choices, employees' preferences, and learning preferences (Galpin, Sanders, and

Chen, 2007), (Mourmant and Gallivan, 2007) amongst many others.

Study carried out by Wiesche and Krcmar (2014), shows that 61.53% studies in personality types was carried out among software developers or professional. However, current trend demonstrate that there is no studies that attempts to explore personality types among software industry in Malaysia. Therefore, this study is intended to fill this gap by attempting to answer the following questions:

- i. What is the personality types amongst software developers in Malaysia?
- ii. Is there any difference of the personality types amongst software developers in Malaysia compared to others?
- iii. Is there any difference of personality types of agile software developers and non-agile developers?

By having this empirical evidence, decision makers can understand patterns of personality types amongst software developers. This can help them to develop a team performance prediction model that deals with the right member composition of personality types, which can improve team performance.

Introduction to personality types

In the field of personality psychology, it is widely accepted that there is a limited range of possible personality types (Myers, McCaulley, Quenk, and Hammer, 1998). For example, introvert and extrovert personality types are opposite and are fundamentally characterizing an individual's personality. This



classification does not aim to assess whether the individual is a good or bad (Myers et al., 1998), but rather to understand differences in the way individuals think and react and thus, finding an effective way to accommodate the differences.

There are several major personalities' theories reported in computing and psychological fields. Amongst the popular personality test are Myers-Briggs Type Indicator (MBTI) (Myers et al., 1998), Keirsey Temperament Sorter (Keirsey and Bates, 1984), and Five-Factor Model (FFM), also known as Big Five (McCrae and John, 1992). The major difference between the three personality tests lies in the descriptions of the personality types. MBTI primarily focuses on what people think, whereas Keirsey Temperament Sorter is more concerned with individual's long-term behaviour (Francis, Craig, and Robbins, 2008). On the other hand, FFM is based on five personality traits—openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, rather than personality types. MBTI and Big Five personality tests useful when examining cognitive and behavioural aspects of individuals due to several correlations of both scales (Furnham, 1996). However, MBTI is widely accepted amongst researchers in software engineering domains (Bradley and Hebert, 1997), (Cunha and Greathead, 2007), (Karn and Cowling, 2006), (Karn, Syed-Abdullah, Cowling, and Holcombe, 2007). Therefore, MBTI personality test was used in this study.

Many of currently available physiological assessment instruments are based on the theories of Carl Jung and Sigmund Freud (Smith, 1989). Given that Carl Jung attempted to classify people into different personality groups, this approach was adopted in the Myers-Briggs Type Indicator (MBTI) created by the Katherine Briggs and Isabel Briggs-Myers mother-daughter team (Myers et al., 1998). The resulting MBTI instrument is a basis of the psychometric type theory of Jungian concept and it can be used to investigate and build personality profiles of software developers. The MBTI scale has four dimensions—Introversion-Extraversion (I-E), Sensing-Intuition (S-N), Thinking-Feeling (T-F), and Judgment-Perception (J-P). The

MBTI test allows individual personality type preferences to be classified according to the 16 types with the results reported as a combination of four dimensional pairs, which are Introversion (I) and Extraversion (E); Sensing (S) and Intuitive (N); Thinking (T) and Feeling (F); and Judging (J) and Perceiving (P). These four dimensions then make up 16 possible combinations of personality type as depicted in Table-1.

Table-1. The 16 MBTI personality types.

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

A person can be classified into one of the 16 personality types based on the largest score obtained. For example, a person scoring higher on Introversion (I) than Extraversion (E); Sensing (S) than Intuition (N); Thinking (T) than Feeling (F); and Judging (J) than Perceiving (P), would be classified as an ISTJ.

Personality types and team performance

Capretz and Ahmed (2010) proposed general guidelines in terms of MBTI personality types that suit software job characteristics, indicating that there is no single personality type that would suit software development teams. This is because software development involving different stages of life cycles—analysis, design, programming, testing, and maintenance. According to the authors, system analysis is better suited for Extrovert-Feeling (EF) personality type, system designer role should be given to a person with Intuitive-Thinking (NT) personality type, programmers should ideally be Introvert-Sensing-Thinking (IST) personality type, testers work best if of Sensing-Judging (SJ) personality type, and maintenance roles suit Sensing-Perceiving (SP) personality types. However, these guidelines need to be proven by testing on a large sample of empirical data.

To date, empirical evidence in which personality types significantly affect software quality is limited and inconsistent. Cunha and Greathead (2007) reported that individual with intuitive and thinking (NT) personality type performed better in code review tasks compared to non-NT type. In another study (Greathead, 2008) also reported that SE professionals with introvert personality type perform better in code comprehension tasks than do those with extrovert type. However, Acuña, Gómez, Hannay, Juristo and Pfahl (2015) found positive correlation between the number of extroverted team members and software quality, while Pešlak (2006) discovered that presence of extroverted, thinking, and judging personality types in the team improved project success. Preliminary findings by Mazni and Sharifah-Lailee (2010) indicated that certain personality types, namely extrovert, sensing, feeling and judging, affect the software project success the most, whereby the last type inevitably affects project success, as most software team members are judging types. In another study by Raza, Zaka-ul-Mustafa and Capretz (2012) indicated that extrovert, sensing, thinking and judging are dominant personality types amongst software engineers in Pakistan. A comparison study of personality types amongst Cuban, Brazilian and Pakistani software engineers has been carried out by Varona, Capretz and Raza (2013). They found that Cuban software engineers are more extrovert compared to software engineers in Brazilian and Pakistan, which are more introvert. In addition, the sensing and thinking dichotomous are predominance personality types among software engineers across the three countries. Wiesche and Krcmar (2014) has carried out comprehensive studies on the personality types studies in SE domain. They suggested that more research need to carry out on developer's personality types and their performance.



DATA COLLECTION METHOD

This study was conducted using a quantitative approach. A questionnaire that consists of Jung Myers Brigg Type Indicator Personality Types (Myers et al., 1998) was distributed to the software developers working in Information Technology (IT) industries located in Northern Region of Malaysia. This study adopting the same personality test questionnaire demonstrated in software engineering and personality types research (Karn and Cowling, 2006), (Karn et al., 2007), (Layman, Williams, Slaten, Berenson, and Vouk, 2008). This personality test is suited in this study because it is easy to administer and allows each member's personality type to be quickly discerned and the results reported. Furthermore, the test is available free of charge, which was also beneficial.

The questionnaire consists of two parts-demographic of participants and the personality types questions. The participation was on voluntary basis and the participants was informed that the data collected from this questionnaire is strictly anonymous and confidential and will be used for research purposes only.

In order to assess the questionnaire, statistical analysis using SPSS tool was used to analyze the data collected. Two types of statistical techniques were chosen, which are: a) descriptive analysis to measure the distribution of personality types amongst software developers and b) chi-square test to test any difference of personality types of software developers that use agile methodology or non-agile methodology when developing software.

ANALYSIS OF RESULTS

Demographic

In this study, demographic information including participant's age, gender, and methodology used in their software development were analyzed. This was done to measure dispersion of data and gain understanding of sampling variation, if any by using descriptive statistics. Table-2 shows the demographic background of the participants. There were 81 participants involved in this study.

Table-2. Demographic analysis.

Characteristics		Number of response (n=81) (Percentage %)
Age	25-34	42 (51.8)
	35-44	29 (35.8)
	44-50	10 (12.3)
Gender	Male	34 (42)
	Female	47 (58)
Methodology used in software development	Agile	34 (42)
	Non-Agile	47 (58)

Majority of participants are between the ages of 25 to 34 years old. This shows that majority of the participants may have experience between 1-10 years. Out of 81

participants, 42% are male and 58% are female. In discussing type of methodology used in this study, 42% of participants applying agile practices during software development and 58% are using non-agile methodology such as waterfall or prototyping model.

Personality types

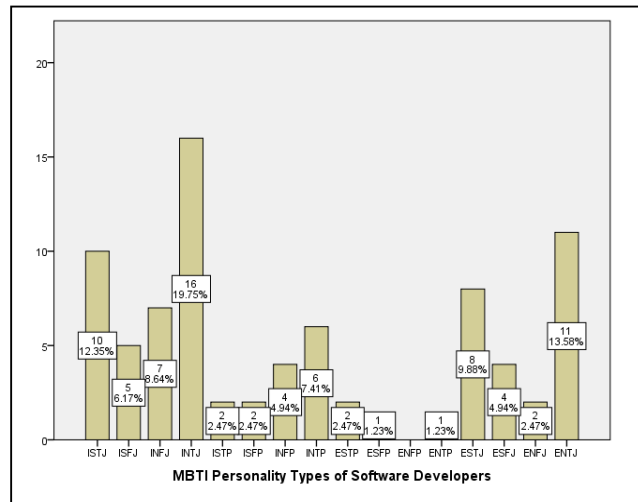


Figure-1. Shows distribution of 16 personality types amongst software developers.

Out of the 16 MBTI personality types, the INTJ (19.75%) personality type has the highest number of software developers as depicted in Figure-1. This is followed by the ENTJ personality types (13.58%), ISTJ (12.35%), ESTJ (9.88%), INFJ (8.64%), INTP (7.41%), ISFJ (6.17%), INFP (4.94%) and then ISTP, ISFP, and ESTP, all have 2% of participants. The ESFP and ENTP, both have only 1%. There is no data representation for ENFP personality types. Based on the results, it shows that the majority of Malaysian software developers are prominent in INTJ, ENTJ and ISTJ personality types. It is consistent with other empirical studies that identified the thinking (T) type as the most dominant personality types among software developers. The software developers are rational, logical, and make decision objectively compared to feelers personality types (Gorla et al. 2004), (Mourmant et al. 2007). This results also showed that the thinking types is also dominant for software developers in Pakistan (Reza et al 2013).

Comparison of personality types and software methodology

This study was further explore is there any difference of personality types amongst software developers that applying agile or non-agile methodology during software development. The analysis is based on the four dimensions of personality types, which are Introvert (I) vs Extrovert (E), Sensing (S) vs Intuitive (N), Thinking (T) vs Feeling (F), and Judging (J) vs Perceiving (P). Cross tab analysis using chi-square test was used to



measure where is any difference of personality types preferences amongst software developers that applying agile methodology or not in their software development.

i) Introvert (I) vs Extrovert (E)

In discussing the I-E personality types, there are more Introverts (64.2%) compared to Extroverts (35.8%) for both methodologies. For agile team, there are 28.40% is introverts, and 13.58% is extroverts. In contrast, for non-agile team, introvert is 35.80% and extroverts 22.22%. This is illustrated in Figure-2. Results shows that there was no significant relationship between team that applying agile or not with I-E personality types preferences, $\chi^2(1, N = 81) = 0.10, p = .75$.

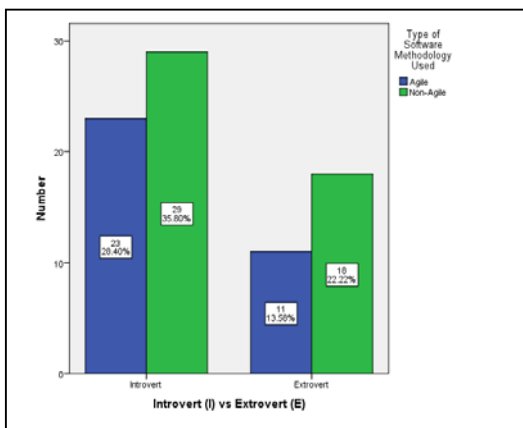


Figure-2. Introvert (I) vs Extrovert (E).

ii) Sensing (S) vs Intuitive (N)

In referring to Figure-3, it shows that Intuitive (58%) personality type is dominant compared to Sensing (42%) types for both software development methodology teams. There is no significance difference on high dominance personality types for both teams, $\chi^2(1, N = 81) = 0.0, p = 1.0$.

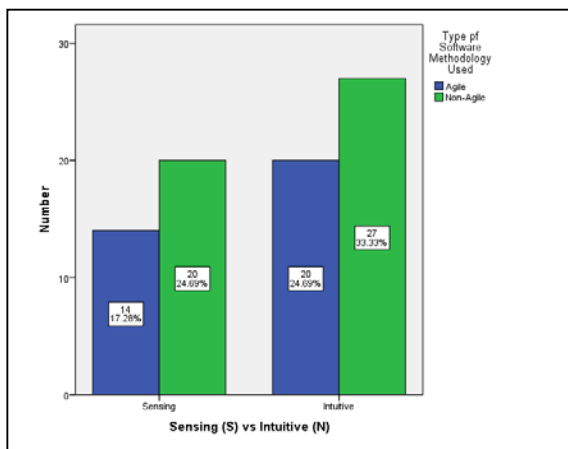


Figure-3. Sensing (S) vs Intuitive (N).

iii) Thinking (T) vs Feeling (F)

For Thinking (T) vs Feeling (F) personality types, it shows that Thinking (72.8) is dominant compared to Feeling (37.2%) type for both teams. For agile team, there are 35.80% is thinking person, and 6.17% is feeling person. In contrast, for non-agile team, thinking type is 37.04% and feeler is 20.99%. There is no significance difference on personality types preferences for both teams, $\chi^2(1, N = 81) = 3.57, p = .06$. Although it is not significant, Feeling (F) type is more dominant in non-agile software developers as in Figure-4.

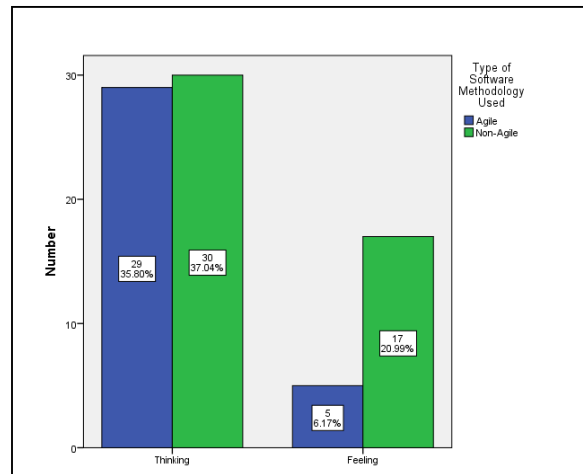


Figure-4. Thinking (T) vs Feeling (F)

iv) Judging (J) vs Perceiving (P)

With regard to Figure-5, it shows that Judging (76.5%) personality type is dominant compared to Perceiving (23.5%) types for both teams. There is no significance difference on high dominance personality types for both teams, $\chi^2(1, N = 81) = 3.51, p = .06$. This shows that there is equally personality types preferences amongst agile and non-agile software developers.

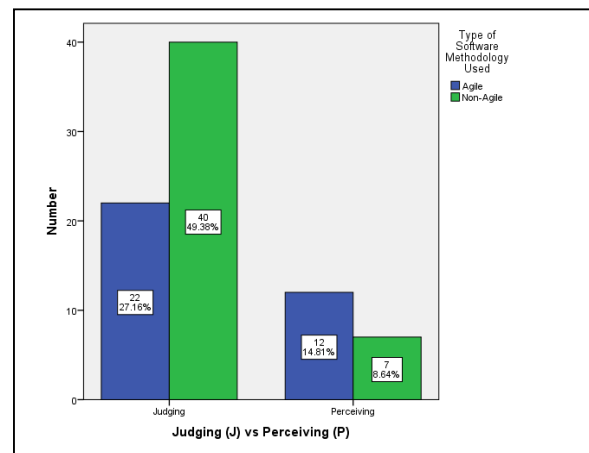


Figure-5. Judging (J) vs Perceiving (P).



In sum, there is no significant difference of personality types preference among software developers that used agile methodology or non-agile methodology. This shows that there is no tendency of which personality types of software developers may apply agile or non-agile methodology during software development activities. Organizational culture and types of project are some of the factors for the team to make a decision whether to choose agile or non-agile practices. The small sample size may also affect the results.

DISCUSSIONS OF RESULTS

There is increasing awareness amongst software engineering researchers that the use of personality types can help determine team performance more accurately, as software engineering tasks require individuals to work in teams in order to deliver software that meets client needs. Thus, being able to determine the most optimal personality type composition in team can help improve their performance.

Software development, in particular programming, is often considered a solely activity. Therefore, programmers are typically assumed to be more introvert, as confirmed by several studies that found information technology (IT) professionals predominantly introverted (Capretz, 2003), (Mourmant and Gallivan, 2007) (Smith, 1989). In contrast, Teague (1998) found that extrovert was a preferred personality type in computing field, as due to more complex demands of modern IT business. In addition, Acuña *et al.* (2015) found positive correlation between the number of extroverted team members and performance. Therefore, extroverted person can significantly improve team performance. In agile environment, communication between client and software developers (IT professionals) plays an important role to ensure that software meets client's requirements. Thus, it is posited that extrovert personality types may contribute to the success of agile software project.

Most software engineers found to be sensing personality types compared to intuitive (Varona *et al.*, 2013). However, in this study, more intuitive personality types among software developers were found. Intuitive person is more innovative compared to sensing, that is more depending on the practical experience. Nevertheless, software development team requires both personality types in order to complement each other.

In this study, it was found that thinking is the dominant personality types compared to feeling. It is consistent with other empirical studies (Gorla *et al.* 2004), (Mourmant *et al.* 2007), (Varona *et al.*, 2013). Thinking software members have realistic views and respect for facts, thus they tend to make decision objectively. In discussing the judging and perceiving personality types, it is common that the software developers are judging types. Judging person tends to be organized and well-planned in doing their daily job tasks.

CONCLUSIONS

The results of this study offer some insight to decision makers in guiding them to select software developers that suits into a specific task. By conducting personality tests, management can realize the importance of existing employees' personality types in order to understand the strengths and weaknesses of their employees. In addition, knowing the personality types of employees can help manager and human resources professionals to plan strategies for improving team members' effectiveness.

Personality profiles of this study are only confined with software developers working in a software industry located in Northern region of Malaysia. Therefore, a more comprehensive study with wider selection of sample industrial participants will be carried out in order to build a software team composition model based on personality types.

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REFERENCES

- Acuña, S. T., Gómez, M., Hannay, J.E., Juristo, N., and Pfahl, D. (2015). Are team personality and climate related to satisfaction and software quality? Aggregating results from a twice replicated experiment. *Journal of Information and Software Technology*, 57(3), pp. 141-156.
- Bradley, J. H., and Hebert, F. J. (1997). The effect of personality type on team performance. *Journal of Management Development*, 16(5), pp. 337-353.
- Capretz, L. F. (2003). Personality types in software engineering. *Int. J. Hum.-Comput. Stud.*, 58(2), pp. 207-214.
- Capretz, L. F., and Ahmed, F. (2010). Making sense of software development and personality types. *IT Professional*, 12(1), 6-13.
- Cunha, A. D. D., and Greathead, D. (2007). Does personality matter?: An analysis of code review ability. *Commun. ACM*, 50(5), pp. 109-112.
- da Silva, F. Q. B., França, A. C. C., Suassuna, M., de Sousa Mariz, L. M. R., Rossiley, I., de Miranda, R. C. G. *et al.* (2013). Team building criteria in software projects: A mix-method replicated study. *Information and Software Technology*, 55(7), pp. 1316-1340.
- Dingsoyr, T., and Dyba, T. (2012). Team effectiveness in software development: Human and cooperative aspects in team effectiveness models and priorities for future studies. *The 5th International Workshop on Cooperative and*



- Human Aspects of Software Engineering (CHASE), IEEE, pp. 27-29.
- Francis, L. J., Craig, C. L., and Robbins, M. (2008). The relationship between the keirseey temperament sorter and the short-form revised eysenck personality questionnaire. *Journal of Individual Differences*, 29(2), pp. 116-120.
- Galpin, V. C., Sanders, I. D., and Chen, P.-y. (2007). Learning styles and personality types of computer science students at a South African university. *SIGCSE Bull.*, 39(3), pp. 201-205.
- Gorla, N., Chiravuri, A., and Meso, P. (2013). Effect of personality type on structured tool comprehension performance. *Requirements Engineering*, 18 (3), pp. 281-292.
- Gorla, N., and Lam, Y. W. (2004). Who should work with whom?: Building effective software project teams. *Commun. ACM*, 47(6), pp. 79-82.
- Greathead, D. (2008). MBTI personality type and student code comprehension skill. The 20th Annual Workshop Psychology of Programming Interest Group, PPIG, pp. 1-13.
- Mazni, O., and Sharifah-Lailee, S.-A. (2010). Identifying effective software engineering (SE) team personality types composition using rough set approach. *The International Conference on Information Technology (ITSim'10)*, IEEE, pp.1499-1503.
- Karn, J., and Cowling, T. (2006). A follow up study of the effect of personality on the performance of software engineering teams. *The International Symposium on Empirical Software Engineering (ISESE '06)*, ACM, pp. 232-241.
- Karn, J., Syed-Abdullah, S., Cowling, A. J., and Holcombe, M. (2007). A study into the effects of personality types and methodology on cohesion in software engineering teams. *Behaviour & Information Technology*, 26 (2), pp. 99-111.
- Keirsey, D., and Bates, M. (1984). *Please understand me: Character and temperament types* (5th edition). Del Mar, California: Prometheus Nemesis
- Layman, L., Williams, L., Slaten, K., Berenson, S., and Vouk, M. (2008). Addressing diverse needs through a balance of agile and plandriven software development methodologies in the core software engineering course. *International Journal on Engineering Education*, 24(4), pp. 659-670.
- McCrae, R. R., and John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, 60(2), pp. 175-215.
- Mourmant, G., and Gallivan, M. (2007). How personality type influences decision paths in the unfolding model of voluntary job turnover: An application to is professionals. *Proceedings of the 2007 ACM SIGMIS CPR conference on Computer personnel research: The global information technology workforce (SIGMIS CPR '07)*, ACM, pp. 134-143.
- Myers, I. B., McCaulley, M. H., Quenk, N. L., and Hammer, A. L. (1998). *MBTI manual: A guide to the development and use of the Myers Briggs Type Indicator* (3rd ed). USA: Consulting Psychologists Press.
- Peslak, A. R. (2006). The impact of personality on information technology team projects. *Proceedings of the 2006 ACM SIGMIS CPR conference on computer personnel research: Forty four years of computer personnel research: achievements, challenges & the future (SIGMIS CPR '06)*, ACM, pp. 273-279.
- Raza, A., Zaka-ul-Mustafa, and Capretz, L. F. (2012). Do personality profiles differ in the Pakistani software industry and academia – a study. *International Journal of Software Engineering (IJSE)*, 3(4), pp. 60-66.
- Smith, D. C. (1989). The personality of the systems analyst: An investigation. *ACM SIGCPR Computer Personnel*, 12(2), pp. 12-14.
- Sommerville, I. (2007). *Software engineering* (8th ed.). Essex, England: Pearson Education.
- Strode, D. E., Huff, S. L., Hope, B., and Link, S. (2012). Coordination in co-located agile software development projects. *Journal of Systems and Software*, 85(6), pp. 1222-1238.
- Teague, J. (1998). Personality type, career preference and implications for computer science recruitment and teaching. *Proceedings of the 3rd Australasian conference on Computer science Education (ACSE '98)*, ACM, pp. 155-163.
- Varona, D., Capretz, L.F. and Raza, A. (2013). A multicultural comparison of software engineers. *World Transaction on Engineering and Technology Education*, 11 (1), pp. 31-35.
- Wiesche, M., and Krcmar, H. (2014). The relationship of personality models and development tasks in software engineering. *Proceedings of the 52nd ACM conference on Computers and people research (SIGSIM-CPR '14)*. ACM, pp. 149-161.