# A MORE REPRESENTATIVE GROUP EMOTIONAL INTELLIGENCE MEASUREMENT AND THE INFLUENCE OF GROUP EMOTIONAL INTELLIGENCE ON GROUP PERFORMANCE

*SIYU WANG*

MPhil

University of York

Electronics

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# Abstract

Emotional intelligence (EI) is a well established personal characteristic. It has been viewed as a critical factor which can influence an individual's academic achievement, ability to work and potential to succeed. When working in a group, emotion is fundamentally connected to the group members' interaction and ability to work as a team, and the ability of a group member to intelligently perceive and understand other members' emotions could make themselves more effective in their work. This ability is known as Group emotional intelligence (Group EI). Previous research has shown that a group with high Group EI performs better when working as a team than groups with lower Group EI, as well as achieves better outcomes. Despite the acknowledged importance of Group EI, most research presents Group EI using the average of each group members' individual EI. It is argued that this Group EI measurement is less representative, as it does not consider other factors within a group (e.g the composition of a group and the role of each individual). Thus, this research looks into the question of how to more representatively measure Group EI in group work. It is proposed that the use of the weighted average of each individual's EI is more representative if the weight is based on an individual's influence in the group. Recent research also demonstrates that the Group EI is a powerful predictor for the group performance. As the proposed Group EI measurement in this thesis claims to be more representative, it is also necessary to demonstrate the impact of the Group EI using the proposed measurement approach on group performance.

This research adopts a multi-methodological research design and a mixed methods approach, involving a combination of both qualitative and quantitative techniques

to establish a metric for Group EI and to assess its impact on group performance. It involves 12 case studies on 12 project groups composed of 70 MSc Engineering Management students, and quantitative data collection from individuals as well as groups using two questionnaires. The information recorded from the case study is interpreted to reflect the emotional characteristics of each group, and the data collected using the questionnaires is analysed using statistical analysis. The results demonstrate that the proposed Group EI measurement is more representative than previous approaches. In addition, the results also demonstrate that teams with a high Group EI are more likely to have a better group performance.

The findings from this research provide a new method for understanding and measuring Group EI, which will potentially provide new insights into the way team members are selected or prepared for project work. It will be beneficial to those in charge of organising groups if the proposed Group EI measurement approach is adopted.

**Key words: emotional intelligence, group emotional intelligence, group performance**

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# Declaration

The research in this thesis was carried out by the author between October 2012 and September 2017 at the Department of Electronics, University of York. This research has not previously been presented for an award at this, or any other, University. Apart from the work whose authors are clearly acknowledged and referenced, all other work contained in this thesis represents the original contribution of the author.

Parts of the thesis are based on my following publications:

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# Chapter 1

# INTRODUCTION

This thesis details the research undertaken to measure and enhance the emotional intelligence (EI) in the teamwork. To begin with, Section 1.1, 1.2, 1.3 and 1.4 introduces the EI, the necessity of EI in teamwork, the new concept to assess Group EI, and the previous studies on Group EI and group performance. Then, this chapter presents the context of current research and then leads to an exploration of the purpose of the research by identifying the research problem, research aim, objectives and hypothesis. This is followed by a justification of why this research is being carried out. A brief description of research methodology is presented aligned with the research objectives, and the contributions to knowledge is summarised. The chapter finally concludes by outlining the structure of the thesis.

## 1.1 Emotional Intelligence

It is widely acknowledged that a person's potential to succeed is normally assessed by intellectual intelligence which can be measured by and is usually known as intelligence quotient (IQ). However, the literature on intelligence has made it clear that one's success in career and personal life depends not only on IQ but also on other personal factors. It is believed that emotional, social, creative, and practical abilities also influence individual's difference in job performance and career suc-

cess [1, 2, 3, 4]. Therefore, it is argued that estimating an individual's possibility for success based on that individual's IQ is not adequate [5].

Chinowsky et al., [6] suggested that the ability of individual to succeed in construction is also dependent upon some traits of EI, such as empathy, emotional awareness, interpersonal skills, and other aspects of knowledge. Moreover, Rosete and Ciarrochi [7] found that a high IQ can help an executive or management person to reach a certain level. However, as soon as they have reached that level, a high IQ can no longer help them to be promoted further or make further achievement. It is EI that can differentiate between an average manager/executive officer and an outstanding manager/executive officer.

One popular book *Emotional Intelligence* written by Goleman [8] make a widespread attention to the concept of EI. In this book, Goleman made a strong claim about the contribution of EI to an individual's career success as well as their job performance. He proposed that IQ is contributing 20% towards life success. He also implied that EI may contribute to the remaining 80% towards life success. Another book from Goleman [9] also suggests that IQ was not the only factor that could predict an individual's job performance. EI can be a more powerful predictor when trying to determine who can success and who cannot. Meanwhile, Mayer and Salovey [10] suggested that general intelligence accounts for approximately 10% to 20% of life success which they defined as academic achievement and occupational status. Therefore, EI and IQ interplay and complement each other, and both are important factors to predict one's success.

Emotional Intelligence (EI) was initially conceptualized as a subset of the domain of "social intelligence", which was proposed in 1909 by an educator John Dewey [11]. And then an early formal definition of EI was proposed by Mayer and Salovey [10] in 1990 as the ability of people to understand and deal with their emotions. Their definition of EI is:

> *. . . the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate*

> *thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth. (p.10)*

This definition provides the basic understanding for the future studies on the different conceptualisation of EI. In addition, the development of EI measurements has been researched in parallel with the development of theoretical models of EI.

## 1.2 The Necessity of Emotional Intelligence In Teamwork

With the development of human civilisation and globalisation, the word cooperation has become more and more popular. Based on cooperation, an individual member's success does not necessarily lead to the group's success. Even if the research claims that a certain method may be able to predict the success of an individual, this ability may not be capable of predicting the success of a group of people who are cooperating to achieve a goal. Google's new study [12] interviewed more than 200 teams across all areas of the business, from Engineering to Product Management, Sales and everything in between. The result shows that having smart people on the team does not necessarily equate to success.

Currently, companies are well known by their project-based nature which has made it one of the most challenging environments to manage people effectively in order to ensure project and organisational success [13]. Different people with different background work together in one group for a short or long period of time to achieve both project and organisational goals. To effectively work in such complex and dynamic environment requires a good interaction between project participants. Songer and Walker [14] indicated that a good interaction involves individuals acting effectively together and/or toward one another. When working in a group, emotion is fundamentally connected to the group members' interaction and teamwork [9]. Edum-Fotwe and McCaffer [15] listed five main skills that are prerequisite for the position of project management. These skills are leadership, communication,

problem-solving, negotiation and management. All of these are important components of the EI construct [16]. Moreover, Jordan and Ashkanasy [17] suggested that emotional self-awareness has a positive impact on effective team interaction as it allows team members to resolve discrepancies between personal goals and team goals. Therefore, it becomes apparent that EI plays a paramount role in daily teamwork.

## 1.3 The New Concept To Assess Emotional Intelligence In Teamwork

Research on EI has revealed that people could make themselves more effective in their work and personal lives by enhancing their EI [8, 18, 19]. Moreover, recent research also demonstrated the contribution of EI in work settings [16, 20, 3]. Hence, the ability of a group to intelligently perceive and understand other members' emotions plays an important role in teamwork [9]. Subsequently, Ashkanasy [21] suggest that Group EI maybe more than the aggregate of group members' individual EI. That means the average of individual EI cannot be used to present the whole EI of one group. In addition, Druskat and Wolff [9] indicated that a team with emotionally intelligent members does not necessarily make for an emotionally intelligent group. A team, like any social group, takes on its own character. At the same time, considering in real life, organisations are more willing to arrange the team roles to construct a team so that the team can achieve the best performance in a project. Thus, developing the concept of Group Emotional Intelligence and its measurement is vital.

Druskat and Wolff [9] proposed one definition of Group EI as:

> *the ability of a group to generate a shared set of norms that manage the emotional process in a way that builds trust, group identity, and group efficacy.* (p.139)

## 1.4 Group Emotional Intelligence and Job Performance

Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives within the given constraints (which was described by Project Management Institute (PMI), with world headquarters in the United States). With the environment in work or life becoming more and more competitive, organizations would like to expect best outcomes, such as profit maximisation, high productivity, and so on. In order to achieve best outcomes, more and more organizations have tried to evaluate the performance of an individual or a group. Performance [22], as an outcome of one project, is completion of a task with application of knowledge, skills and abilities.

For example, it is quite common nowadays for a software company to organise software engineers to develop a software product. These engineers work together to design, implement and verify the software to a ready-to-sell status, based on company standards. In addition to the technical work, engineers will also interact with people from other departments (e.g marketing team or sales team) to better define the product, so that the market will be more likely to accept and buy such a product. This mechanism is a typical example of cooperation. However, during such cooperation, issues may occur between any parties involved in the cooperation. The engineer may disagree with the decision from the marketing or sales team or vice versa. An engineer may also disagree with other engineers in various ways (e.g the way they work, the solution they propose, etc). In such a situation, people may not work effectively and the quality of the final outcome may decrease. In order to optimise the outcome of projects which are carried out cooperatively, people started trying to find a way to estimate how well a group of people will work together.

As introduced in Section 1.2, EI is a more powerful predictor for individual work performance. In the case of interpersonal relationships in the workplace, there are an increasing number of studies investigate the value of EI in project management.

The subject of EI in the workplace has became the hottest topics in the project management domain [23]. In addition, Goleman [24] in a post hoc analysis across a broad range of industries found that 67% of the competencies determining differential team performance can be summarised as Group EI characteristics. Thus, this research aims to find a more representative way to assess Group EI, and investigate the relationship between Group EI and group performance.

## 1.5 The Justification for Current Study

In order to give a more detailed introduction to the research scope of this thesis, it is important to identify the gaps in the current research in Group EI. Therefore, this section will begin by briefly introducing the current research status. Then, based on the identified gaps, the research questions, and the research hypothesis for each research question will be presented in Chapter 3.

As the concept of Group EI [9] was initially introduced after the introduction of EI in the 1990s, it is still a relatively new concept in the research. Therefore, although tremendous effort has been put into this domain, there are still a lot of Group EI related questions waiting to be answered or improved.

To the best knowledge of the author, the existing research [19, 18, 25, 20] in Group EI on the relationship between Group EI and group performance measurements in different industries/professions, all assumes the Group EI measurement to be the average value of the EI measurements of each group member. For example, a group contains three members (A, B and C). A's EI measurement is 55, B's EI measurement is 80, and C's EI measurement is 75. The Group EI measurement is calculated using the average value of A's, B's and C's EI measurements, which is 70. Such a measurement is simple to obtain and does not require additional information or data (e.g the group member's responsibility within the group or the importance of a certain role within the group) to derive the Group EI measurement. Although the research concludes that the Group EI measurement correlates to the measurements of performance, it is still believed that these Group EI measurement approaches are not representative, as they all ignore the composition of the group.

It is believed that a person's EI and his/her role in a group should all contribute to the measurement of the Group EI. For example, a group is composed of three members. One of the three member has very high individual EI whereas the other two members have very low individual EI. In this case, if the person with high individual EI is the leader of this group and the other two persons are just the workers in this group, this group should have a higher Group EI. The reason for this is that the leader will have the ability to understand and manage both his/her own emotions and the others' emotions, as the leader has higher individual EI compared to the other two members. Furthermore, due to the high individual EI, the leader is more likely to be able to resolve possible conflicts between other group members. Therefore, this group is considered to have better Group EI and will have a better performance. On the other hand, if one of the persons with low individual EI is the group leader, the group with such configuration may have lower Group EI, despite the average EI of the three group members being the same as before. This is caused by the leader possibly having less ability to handle the emotions within the group and between groups. Therefore, it is believed that measuring Group EI by averaging all group members' individual EI is not enough.

As well as the issue with how existing research measures Group EI, there are other issues related to group performance measurement. So far, a lot of the existing research [19, 2, 18] measures group performance by temporarily organising a number of groups together and handing out task papers to each group. Each group is then given several hours to perform the task and an overall mark for the task is calculated for each group. The mark is used to represent the performance of a specific group. However, as Levitis et al. [26] has pointed out that there are many attributes of a group that represent the group performance. Although the mark for a task can be one of those attributes, it is not comprehensive if only the mark is used to assess the group performance. Therefore, it is also important to investigate the relationship between Group EI and more characteristics of group performance.

## 1.6 The Scope of This Research

Based on the research gap, the purpose of this research is investigating a more representative Group EI measurement approach in the context of engineering management, and it incorporates the information of the composition of a group and an individual's role in that group. Subsequently, it is more important in this research to investigate the influence of Group EI on the group performance. The research question and hypothesis present in the following.

### 1.6.1 Research Questions and Hypothesis

Based on the current research and the identified research gaps, the research presented in this thesis will mainly investigate the following two research questions:

- **Research Question 1:** How can overall Group EI be more representatively measured compared to existing approaches?

- **Research Question 2:** What is the influence of Group EI on group performance?

For each research question, the author of this thesis held the following hypotheses before the research was carried out.

Research Question 1 hypothesis:

> The weighted average of individual EI scores as an indicator of the overall EI of a group based on different roles' contributions to team-based work is more representative than the average of individual EIs.

Research Question 2 hypothesis:

> Group emotional intelligence is positively correlated with group performance.

### 1.6.2 Research Methodology

The majority of the EI researches so far rely on mono-method research methodology (e.g using either qualitative or quantitative research method). It is rare that a research uses a mixed-method approach in the EI literature. As further discussed in Chapter 4, Mingers [27] argued that no one paradigm can capture the richness of real-world situations. Hence, adopting only one paradigm is inevitably gaining only a limited view of a particular intervention or research situation. In order to address the limitation of using mono-method research methodology in previous studies, this research adopts a mixed-method research methodology by combining multiple data collection techniques, and using both quantitative and qualitative data analysis methods to provide a more comprehensive understanding of the Group EI, as well as the relationship between Group EI and group performance. The research design is devised in line with the research aim and objectives as shown in Figure 1.1.

### 1.6.3 Research Contributions

Through carrying out the research to address the research questions, the following research contributions have been made and are presented in this thesis:

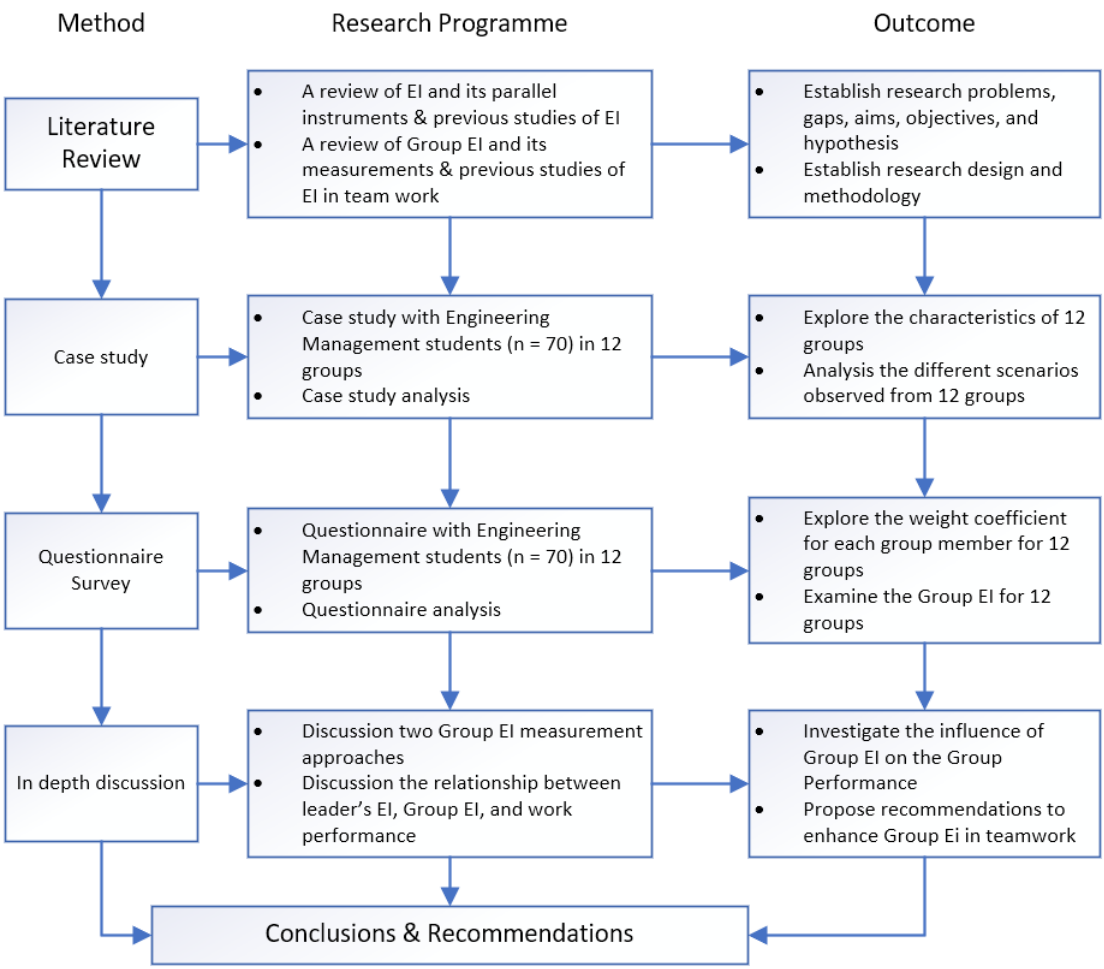
- Identifying a gap in the existing Group EI research literature, which is that the Group EI measurement does not consider the role and responsibility of each group member.

- Identifying that existing research methodologies in measuring the group EI and group performance are not realistic, so that the results obtained from such methodologies may not truly reflect the reality.

- Proposing a new Group EI measurement approach, whose calculation considers the role and responsibility of each member in the group.

- Proposing a new research methodology which uses real scenarios instead of hypothetical/simulated scenarios to carry out the research.

Figure 1.1: Research Design




- Carrying out experiments following the proposed research methodology to show that the proposed Group EI measurement approach is more representative than the existing approaches.

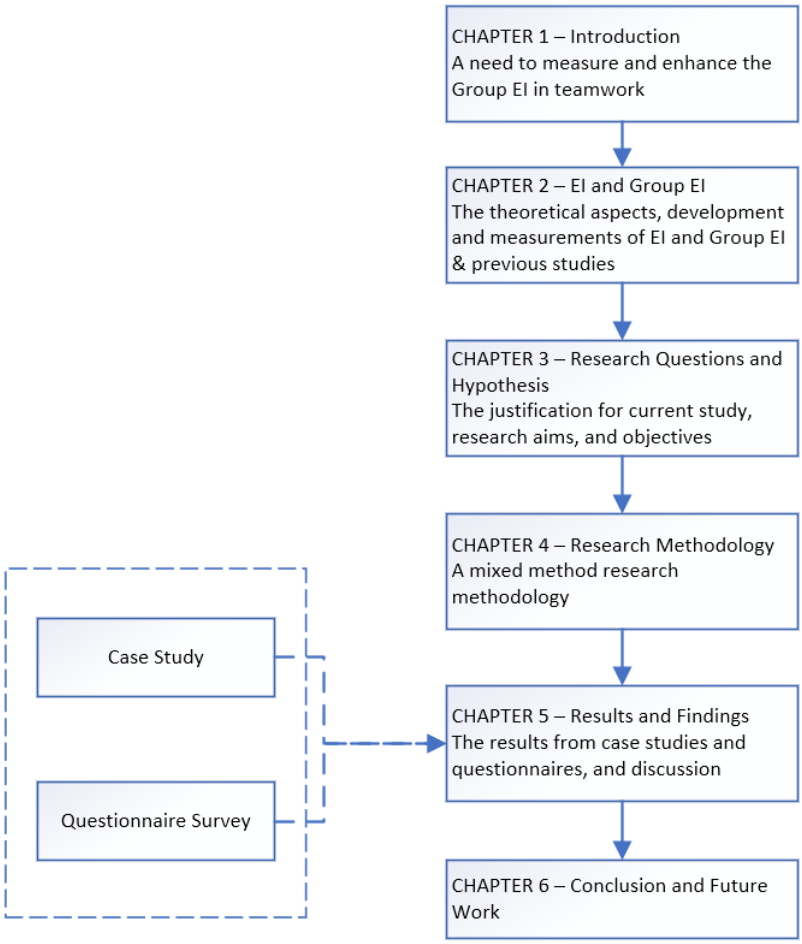
- Carrying out experiments to explore the proposed Group EI measurement's influence on various other group performance measurements which have yet to be explored in the existing research.

## 1.7 Thesis Structure

This thesis is organised into six chapters, and appendices containing additional information. In order to clearly present the research that has been introduced in this section, Figure 1.2 presents a schematic representation of the thesis indicating

how the chapters inter-relate. The content of the thesis is as follows:

Figure 1.2: Structure of the thesis




- **Chapter 2 -** This chapter gives a comprehensive literature reviews of the existing research. This review includes the definition of EI and Group EI, how EI and Group EI is measured in the existing research, and the relationship between EI, Group EI and other relevant concepts (e.g personality). The definition of group performance in the existing research is reviewed, followed by the approaches to group performance measurement. The last section in this chapter reviews the research methods used in the literature and potential research gap.

- **Chapter 3 -** This chapter justifies the research presented in this thesis in detail. This justification involves a detailed discussion of the existing research and the gaps, which then leads to the research objectives. Based on the

objectives, the research questions are then presented and justified in detail. For each research question, the hypotheses are then given.

- **Chapter 4 -** This chapter discusses and justifies the methodology that is used in the research. The justification in this chapter begins by introducing the research philosophy that is held by the researcher. Based on the research philosophy, the methodology and the research design are then presented, including the steps followed to investigate and address the research questions. The resources that were required by the proposed approach are introduced, based on the research philosophy and methodology. The research validity, reliability and ethical considerations of the methodology are also given.

- **Chapter 5 -** This chapter presents the results which were obtained from the research with a discussion of the results and the conclusions drawn from the results.

- **Chapter 6 -** This chapter summarises the findings from this research through re-visiting the research questions. The limitations of this research are then discussed. Finally, possible future research topics in this domain are proposed.

# Chapter 2

# LITERATURE REVIEW - GROUP EMOTIONAL INTELLIGENCE AND GROUP PERFORMANCE

This chapter presents a literature survey of Emotional Intelligence (EI), Group Emotional Intelligence (Group EI), Group Performance, and the relationships between these domains. To begin with, Section 2.1 introduces the basic concept of EI, which includes the definition of EI, and existing EI models and approaches to their measurements. Then, Section 2.2 presents a review of the literature on the relationships between EI and other areas which are valuable to group management. These include gender, experience, personality, alexithymia, leadership, and project management. With the knowledge of EI and the value of EI in group management, Section 2.3 reviews the concept of Group EI and how Group EI is applied to a group. Approaches to the measurement of Group EI are then reviewed in Section 2.4. To the purpose of understanding how the Group EI affecting the teamwork, the relationship between Group EI and group performance is reviewed in Section 2.5. Finally, the findings from the existing literature are summarised in Section 2.7.

## 2.1 What is Emotional Intelligence?

### 2.1.1 The Definition of EI

In 1983, Gardner [28] raised one idea of multiple intelligence, which includes intrapersonal and interpersonal intelligence. Intrapersonal intelligence is the ability to understand one's own feelings, motivations and fears, whereas interpersonal intelligence is the ability to understand others in terms of their emotions, motivations and intentions. This concept provided the foundation for later research in EI [29]. EI was initially conceptualized as a subset of the domain of "social intelligence", which was proposed in 1909 by an educator John Dewey [11]. And then an early formal definition of EI was proposed by Mayer and Salovey [10] in 1990 as the ability of people to understand and deal with their emotions. Their definition of EI is:

> *. . . the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth. (p.10)*

Goleman [8] proposed an alternative EI definition that had two overall categories of competence: personal competence and social competence. Personal competence includes Self-Awareness, Self-Regulation and Self-Motivation and social competence includes Social Awareness and Social Skills. These skills include the capabilities of recognising others' emotions and needs, whilst also helping them to manage their emotions, in order to achieve desirable responses. Thus, Goleman [16] defined EI as:

> *. . . the capacity for recognising our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationships. (p.37)*

Petrides and Furnham [30] proposed that EI is

*a constellation of emotional self-perceptions located at the lower levels of personality.*

Comparing with above definitions, Mikolajczak, Petrides, Coumans, and Luminet [31] proposed another way to define EI with a tripartite model, where EI operates on three levels - knowledge, abilities, and traits. The knowledge level refers to the emotional understanding from the conceptualisation. The ability level refers to the capability of effectively applying this knowledge in emotional situation, and the traits level refers to underlying emotion related traits in order to manage usual behaviours [32].

Whilst EI has become more widely recognised recently, one major challenge is that there is no one agreed definition of EI. There is a disagreement between researchers on the construct of EI due to its wide-ranging, which ranging include what it represents conceptually, and how much of our behaviour is affected by EI [33, 34, 35]. Dacre Pool and Qualter also stated that *"EI is one of those concepts we find it easier to recognize than to define"* [32]. For example, the leader is able to understand their followers' vision, or the teacher is able to understand who is the most stubborn child. Moreover, there have been a controversy about how EI should be conceptualised (ability EI vs. trait EI) and measured (self-report vs. performance measures) [36]. However, in general, there is a common core of basic concepts in all the EI constructs: the ability to identify, assess and control the emotions of oneself, of others and of groups.

Although an agreed definition of EI and the most appropriate method of measuring EI currently is an area of controversy, there have been several models that attempt to fully represent EI. In previous EI studies, all EI definitions can be grouped into two different theoretical EI models: ability model of EI [10] and mixed (or trait) models of EI [8, 37, 30, 38, 39]. There are also many models of mixed (or trait) EI, such as Goleman's mixed EI model, Bar-On's EI model, and trait EI model. Thus, the following section reviews four widely used models of EI.

### 2.1.2 Ability EI Model

The ability EI model [10] is proposed by Mayer and Salovey [10]. Mayer and Salovey originally presented ability EI as a part of social intelligence. It concerns not only a person's perceptions of their own emotional ability, but also people's ability to recognise, understand and manage their emotions. Ability EI [35] initially consists of four specific emotional and mental abilities:

- **Emotional perception** means that people need to be aware of their own feelings and emotions so that they can have accurate information about the world in which they communicate and send emotional messages [40]. In addition, being aware of others' emotions is useful when working with people. This individual ability starts with recognising emotional clues and then accurately identifying what these mean.

- **Emotional facilitation** is integrating emotion to facilitate thought, and requires people to know which moods are suitable for which situations, and then adopting the right mood. If people can be aware of their emotions, which contain valuable information, they can utilise them to be more positive [35].

- **Emotional understanding** is an ability to understand the information contained in the emotions. Such ability includes having insight into themselves, and others. In addition, this ability also includes comprehending how emotions evolve over time [35].

- **Emotional management** is the ability to self-regulate the emotions and to regulate the emotions in others. Therefore, by knowing how to manage emotions, one can still achieve the desired goals, despite experiencing a negative emotion [35].

Some researchers recommend a three-branch model of ability EI with abilities of emotional perception, emotional understanding and emotional management

[41, 42] as it is difficult to identify the conceptual distinction between emotional facilitation and emotional management [43, 44]. The result from a meta-analysis of ability EI measurement (MSCEIT, which will be reviewed in the section 2.1.6) shows a very high correlation between emotional facilitation and emotional perception factors ($r = 0.90$) [42] (Correlation is the statistics test that measures the statistical relationship, or association, between two continuous variables [45]. Strong correlation: $r$ lies between $\pm 0.50$ and $\pm 1$, moderate correlation: $r$ lies between $\pm 0.30$ and $\pm 0.49$, low degree: $r < \pm 0.29$, no correlation: $r = 0$.). Thus, some researchers suggested that emotional facilitation could be redundant with emotional management. Thus, there are increasing studies [42, 46, 47] which tend to use the three-branch model instead of four-branch model of ability EI.

### 2.1.3 Mixed EI Model

The mixed model of EI, represented by Goleman [16], takes another approach to EI, which combines emotional abilities with elements of personality, motivation, and social skills [37, 16] (e.g recognising the need for changes; choosing team members based on expertise). There are many models of mixed EI. The early version of Goleman mixed model consists of four domains: self-awareness, self-regulation, social awareness, and social skills. The other version of the Goleman mixed model can be organised into five dimensions: self-awareness, self-management, motivation, empathy, and social skills. Each of the five EI dimensions is discussed below.

- **Self-awareness** is the ability to recognise and understand your moods, emotions and drives, as well as their effect on others [16].
- **Self-management** is the ability to control or redirect disruptive impulses and moods [16].
- **Motivation** is a passion to work for reasons that go beyond money or status [16].
- **Empathy** is the ability to understand the emotional makeup of other people and skill in treating people according to their emotional reactions [16].

- **Social Skill** is proficiency in managing relationships and building networks [16].

According to the Goleman's study in 1998 [16], these EI abilities are considered to be independent (each contributes to job performance), interdependent (each draws to some extent on certain others with strong interactions), hierarchical (the EI capabilities build upon one another), and necessary. Also, they are considered to be not sufficient (having an emotional intelligence does not guarantee that the competencies will be demonstrated), and not generic (different jobs make different competence demands).

Bar-On [37] designed the Bar-On model of emotional-social intelligence [48] which is another example of a mixed-EI model. It is defined by Bar-On [48] as:

> *. . . a cross-section of interrelated emotional and social competencies, skills and facilitators that determine how effectively we understand and express ourselves, understand others and relate with them, and cope with daily demands. (p.2)*

Bar-On model includes the five key components described as intrapersonal skills, interpersonal skills, stress management, adaptability, and general mood. In this model, intrapersonal ability includes being aware of oneself, understanding one's strengths and weaknesses, and expressing one's feelings and thoughts non-destructively. Interpersonal encompasses the ability to be aware of others' emotions, feelings and needs, and to establish and maintain cooperative, constructive and mutually satisfying relationships. Ultimately, to be emotionally and socially intelligent is to effectively understand and express oneself, to understand and relate well to others, and to successfully cope with daily demands, challenges and pressures.

To better understand the Bar-On model of emotional-social intelligence and how it developed, it is important to first describe the Emotional Quotient Inventory (the

EQ-i) [49] (will be reviewed in Section 2.1.6) which has played an instrumental role in developing this model.

Another mixed EI model (also is known as trait EI model) is proposed by Petrides and Furnham [39]. The trait EI model aims at providing comprehensive coverage of the emotion-related aspects of personality, motivation, and social skill [16]. The sampling domain, which contains 15 facets and the characteristics of good facets, are displayed in Table 2.1. Trait EI shows strong relationships with major personality traits such as emotional stability [50].

Table 2.1: The Sampling Domain of Trait EI in Adults (Quote from [51])

| **Facets** | **High scores view themselves as...** |
|---|---|
| Adaptability | ...flexible and willing to adapt to new conditions |
| Assertiveness | ...forthright, frank, and willing to stand up for their rights |
| Emotion Expression | ...capable of communicating their feelings to others |
| Emotion management | ...capable of influencing other people's feelings |
| Emotion perception | ...clear about their own and other people's feeling |
| Emotion regulation | ...capable of controlling their emotions |
| Impulsiveness | ...reflective and less likely to give in to their urges |
| Relationships | ...capable of maintaining fulfilling personal relationships |
| Self-esteem | ...successful and self-confident |
| Self-motivation | ...driven and unlikely to give up in the face of adversity |
| Social awareness | ...accomplished networkers with superior social skills |
| Trait empathy | ...capable of taking someone else's perspective |
| Trait happiness | ...cheerful and satisfied with their lives |
| Trait optimism | ...confident and likely to "look on the bright side" of life |

Trait EI is considered to comprise part of the personality domain. A number of studies have shown that trait EI has a large correlation to some traits of the Big Five personality test [52, 38] (the relationship between EI and personality will be discussed in the Section 2.2.2). The results from those studies raise one question: is the trait EI the same with personality? By carrying out the factor analysis on the factor scales in trait EI measurement (TEIQue) and the personality scales, it can be shown that the trait EI is distinct from the personality.

### 2.1.4 A Comparison of Different EI Models

Although different EI models were developed based on the different EI perspectives of the developers, they all share some similarities as well as some differences. For

example, all EI models are considering some common attributes of a person such as the abilities to accurately perceive, evaluate, regulate and express one's emotions. However, they also have some important differences. Bar-On [37] identifies a diverse range of factors such as assertiveness, self-esteem, and independence. However, these factors are clearly beyond the definition from Mayer and Salovey. Mayer et al. [53] suggested that ability EI construction focuses on the link between the cognitive and emotional aspects of intelligence and should not be considered as another set of personality dimensions. Ability EI requires the use of maximum performance tests with correct and incorrect responses and pertains primarily to the realm of cognitive ability, *"which is accordingly the most appropriately measures by performance tests"* [30], whereas mixed or trait EI model pertains to the realm of personality, *which can be assessed by self-report questionnaire* [30].

Petrides and Furnham [30] argue that a similar distinction between different EI models can be further revealed by not only the theoretical approaches, but also the type of measurement approaches. For example, it is considered that the trait EI model is influenced by the personality whereas the ability EI model is influenced by intelligence. Their results indicate that the correlation between measurements of trait EI and ability EI were relatively low, which supports the explicit distinction between their measurements [54].

A comparison of different EI models and different EI measures (which will be reviewed in Section 2.1.6) are summarised in Table 2.2. Different researchers using different definition of EI to represent different meanings. Different perspectives have also led to many different approaches to measure EI. Therefore, it is very important to clarify the conceptualisation of EI as well as the model to be used in any research project. Furthermore, the question of 'can EI be measured' can be answered in the next section.

### 2.1.5 EI Measurement Approaches

It is commonly believed that EI as an ability is less constrained by social factors [36]. Mayer et al., [57] suggested that EI is *"suggestive of a kinder, gentler intel-*

Table 2.2: A Comparison of Emotional Intelligence Measures

| | Performance Measures | Self-report | | 360-degree |
|---|---|---|---|---|
| **Instruments** | **MSCEIT 2.0** | **ECI 2.0** | **EQ-i** | **TEIQue** |
| **Authors** | Mayer, Salovey and Caruso [55] | Boyatzis, Goleman and Rhee [56] | Bar-On [37] | Petrides and Furnham [51] |
| **EI Model** | Ability EI model of Mayer and Salovey | Goleman Mixed EI model | Bar-On model | Trait EI model |
| **Dimensions Measured** | Emotional perception, facilitation, understanding and management. | Self-awareness, social awareness, self-management, social skills. | Intrapersonal, Interpersonal, Stress management, Adaptability, General Moods. | Emotionality, self-control, sociability and well-being. |
| **Instrument Design** | 141 scales metal ability items | 360-degree assessment on 18 competencies in 4 dimensions. | 133 mixed model items | 153 items |
| **Number of data samples** | 2112 | 596 | 3881 (Air Force participants) | 740 |
| **Reliability** | Good full-test split-half reliability. | Parts are reliable in test-retest. | Adequate test-retest reliability. | Good test-retest reliability. |
| **Relation to Personality** | Comparing with Big Five Personality test, two distinct models | No significant correlations between ECI 2.0 and Eysenck's Personality Questionnaire (EPQ). | Two distinct models, although strongly correlated with Big Five Personality test. | 5 of 5 factors strongly related with Big Five Personality test. |
| **Gender Difference** | Females score higher than males. | Females score higher than males. | Males score higher than females under stress tolerance; and females score higher than males at interpersonal scales. | No significant difference. |
| **Instrument Available** | Non-public | Non-public | Non-public | Free |

*ligence – an intelligence anyone can have"* (p.97). Moreover, the development of different EI measures has been proposed along with the development of different theoretical EI models. Depending on the method of assessment and the purpose, existing EI measurement approaches can be categorised into four categories: *self-report*, *informants*, *ability-based* or *performance measurement*, and *360-degree assessment* [58]. The detail of each category is explained below.

**Self-report**

The self-report method is a type of survey or questionnaire which involves asking participants about their feelings, attitudes, beliefs and many other aspects. Participants need to select a response by themselves, without the researcher's interference. Self-report is an effective and time-saving approach as the response depends on the individual's understanding of the questions. However, the potential problem of self-report is response bias. Response bias is the tendency of a person to answer questions on a survey untruthfully or misleadingly [45]. For example, if the participant's understanding of the question is inaccurate, the result will also be inaccurate as it only presents what the participant thinks instead of what the questionnaire asks [53]. Furthermore, the participant may feel pressure to give answers that are socially acceptable. Subsequently, this potential problem may results in the validity problem.

Table 2.3 presents the types of response style (RS), which is a respondent's tendency to respond to survey questions in certain ways regardless of the content, and they contribute to systematic error [59]. Vaerenbergh et al., [59] proposed several ways to diagnose and control RS as shown in Table 2.4. For example, using double agreements on reversed items or specifying a method factor on balanced-scale items requires the use of balanced-scale items. The types of RS is also common potential problems in informants method and 360-degree assessment method. Meanwhile, the methods of remedying RS are suitable for informants method and 360-degree assessment method.

In contrast to self-report, informant approaches measure EI through the opinions of

Table 2.3: The Types of Response Style (Quote from [59])

| Type | Definition | Respondent's use of a 7-point rating scale[a] | Consequences | Representative studies |
|---|---|---|---|---|
| ARS | Tendency to agree with items regardless of content, only the highest response categories are used | ○○○○●●● | Inflates observed means, increases magnitude of multivariate relationships | Baumgartner & Steenkamp (2001); Greenleaf (1992b) |
| DARS | Tendency to disagree with items regardless of content, only the lowest response categories are used | ●●●○○○○ | Deflates observed means, increases magnitude of multivariate relationships | Baumgartner & Steenkamp (2001); Stenning & Everett (1984) |
| MRS | Tendency to use the middle response category of a rating scale, regardless of content | ○○○●○○○ | Brings observed means closer to the mid-point, deflates variance, increases magnitude of multivariate relationships | Baumgartner & Steenkamp (2001); Weijters, Geuens, & Schillewaert (2008) |
| ERS | Tendency to use the highest and lowest response categories of a rating scale | ●○○○○○● | Inflates (deflates) observed means variance, decreases magnitude of multivariate relationships | Baumgartner & Steenkamp (2001); Greenleaf (1992b) |
| MLRS | Tendency to avoid the highest and lowest response categories of a rating scale. This is the complement of ERS | ○●●●●●○ | Brings observed means closer to the mid-point, deflates variance, increases magnitude of multivariate relationships | Hurley (1998); Moors (2008) |
| NARS | Tendency to show greater acquiescence than disacquiescence. | | Inflates variance, deflates observed means if negative | Baumgartner & Steenkamp (2001); Weijters, Cabooter, & Schillewaert (2010a) |
| RR | Tendency to use a narrow or wide range of response categories around the mean response | | When large: inflates variance, decreases magnitude of multivariate relationships | Greenleaf (1992b) |
| NCR | Tendency to respond to items carelessly, randomly, or nonpurposefully | | No a priori hypotheses about the effect can be specified | Baumgartner & Steenkamp (2001); Watkins & Chueng (1995) |

*Note.* [a]A 7-point scale is used only for illustrative purposes; RS are also present in other types of rating scales. Black dots indicate the response categories a respondent is more likely to use under a certain RS.
ARS = Acquiescence response style; DARS = Disacquiescence response style; MRS = Mid-point response style; ERS = Extreme response style; MLRS = Mild response style; NARS = Net acquiescence response style; RR = Response range; NCR = Noncontingent responding.

Table 2.4: The Methods of Detecting and Correcting for RS (Quote from [59])

| Measurement of RS | Description | Advantages | Disadvantages | Representative studies |
|---|---|---|---|---|
| Count procedure | Count the number of agreements, disagreements, extreme responses, and/or mid-point responses on substantive measures across an entire questionnaire | Easy to use, no additional indicators are necessary | Only works with heterogeneous items | Bachman & O'Malley (1984); Reynolds & Smith (2010) |
| Counting double agreements on reversed items | Include reversed items in the questionnaire, and count the number of double agreements on the reversed items | Easy to use, no additional indicators are necessary | Sometimes difficult to formulate reversed items, people's responses to reversed items might be due to interpretational factors | Hox, De Leeuw, & Kreft (1991); Johnson et al. (2005) |
| MTMM | The same trait is repeatedly measured by means of different methods. Observed variance can be decomposed into true variance and error variance | Easy to set up, easy to use, measures net effects of ARS and DARS, no additional indicators are necessary | Gives no indication of ERS and MRS, consistency bias and memory effects might arise due to repeated measurement, problems of identification arise often | Saris & Aalberts (2003); Saris, Satorra, & Coenders (2004) |
| Specify method factor in CFA | Specify positive and negative loadings on content factor, specify positive loadings on a method factor | Relatively easy to specify, most researchers are familiar with CFA, no additional indicators are necessary | Does not control for DARS, MRS, or ERS; requires the use of balanced scale items; all loadings on the method factor are restricted to equality in order to identify the model | Billiet & McClendon (2000); Welkenhuysen-Gybels et al. (2003) |
| Latent-class regression analysis | Run a latent-class regression analysis, and assess whether a method factor emerges | No additional indicators are necessary | Specific software is necessary, researchers might be unfamiliar with latent-class analysis, sometimes hard to specify | Moors (2010); Van Rosmalen, Van Herk, & Groenen (2010) |
| LCFA | Specify two method factors, one to measure ARS, one to measure ERS | No additional indicators are necessary, recent models allow discriminating ARS and ERS | Does not account for DARS and MRS, specific software is necessary, researchers might be unfamiliar with LCFA | Moors (2003, 2012); Kieruj & Moors (2010, 2012) |

other people. It requires the participant to rate a specified person other than himself/herself based on the items in the questionnaire. The informant approach can provide benefits for people to obtain broad aspects from others. However, Mayer et al. argue that the information generated by the informant approach is more dependent on a person's reputation than the person's actual ability [53]. For example, a person's reputation can be influenced by many factors, such as personality and how well the person gets along with others.

#### Ability or Performance Measures

When using ability or performance measurement approaches, the EI is measured based on the results of a series of tasks which are performed by the participant [53]. For example, the participant will be asked to distinguish the facial expressions in a picture. Mayer et al., [53] claimed that ability measurement approach is the best measures in intelligence studies as intelligence corresponds to the actual capacities to perform well at mental tasks, not just one's beliefs about those capacities. However, Jordan et al., [20] argued that why attempt to link EI to general intelligence? This is because the authors believe that it does not conform to Gardner's [28] conceptualisation of multiple intelligence and the construct of interpersonal and intrapersonal intelligence upon which the idea of EI is predicated.

#### 360-Degree Assessment

360-degree assessment is a peer to peer survey designed to supply feedback to participants, not only from a self-assessment perspective, but also from a variety of other perspectives, including managers and other group members. It is a way to perceive both the individual through themselves and others, and the impact of individuals on other group members in the team [58]. This is more helpful than a self-assessment alone as it provides objective feedback. However, it is difficult to implement 360-degree assessment if group members are not enthusiastic about this assessment. In project management, some researchers also develop other purposes for the 360-degree assessment to evaluate other factors such as communication and group effectiveness.

### 2.1.6 How to measure Emotional Intelligence?

In Dacre Pool and Qualter's book on *An Introduction to Emotional Intelligence* [32], there are many instruments which have been developed in parallel with various conceptualisations of EI. Based on different EI models, these EI measurements vary widely in both their content and their method of assessment. Moreover, there are different versions for each measurement to be valid for different purposes [8, 37], such as adult version and child version, or full version and short version. According to four different EI models (Mayer and Salovey's ability EI model, Goleman's mixed EI model, Bar-On EI model, and trait EI model) in Section 2.1.2 and Section 2.1.3, this section presents four widely used measurements with the highest frequency in related studies of individual EI [32, 36, 58, 9]. These are MSCEIT (Mayer-Salovey-Caruso Emotional Intelligence Test), EQ-i (Bar-On Emotional Quotient Inventory), ECI (Emotional Competence Inventory), and TEIQue (Trait Emotional Intelligence Questionnaire).

#### Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)

The ability EI model requires the use of performance tests to measure people's ability to respond their emotions. The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) comes from the first published ability measure specifically intended to assess ability EI which is known as Multi-factor Emotional Intelligence Scale (MEIS) [60]. MSCEIT V2.0 [55] is an ability test measurement designed to measure the four dimensions of the ability EI model of Mayer and Salovey. The four dimensions are emotional perception, emotional facilitation, emotional understanding and emotional management. The test consists of 141 items which used to measure how well people performing tasks and solving emotional problems. It requires the participants to interpret emotional information presented by facial expressions, to evaluate what moods facilitate performance on various tasks, to understand blends of emotions, and to make a response. MSCEIT utilises a consensus based scoring approach. It generates a total EI score, two area scores, four branch scores and eight task scores with graphic representations and detailed explanations of score meanings.

The MSCEIT full-test split-half reliability is good ($r(1985) = 0.93$ for general and $r(1985) = 0.91$ for expert consensus scoring) [55]. Moreover, the result of Day's and Carroll's [18] study shows that there is a small to moderate correlation between MSCEIT and personality traits.

**Reliability** is the precision of measurement, or extent to which test scores consistently measure the same thing. Reliability can vary from zero to one. If the value is higher than $0.70$, the reliability can be considered adequate for research applications; and if the value is higher than $0.90$, it can be considered adequate for any high-stakes decision about an individual. There are four methods have been developed to estimate the reliability [61]: Test-retest reliability method, Parallel-forms method, Split-half method, and Internal consistency.

- **Test-retest reliability method** is particularly important for scales designed to measure constructs that are supported to be stable [61]. If a test of conscientiousness, test-retest reliability can be demonstrated over a long period, and then be interpreted as evidence that a construct is stable ( i.e., a survey is administered twice to the same individuals with a period of time between assessments).

- **Parallel-forms method** is the development of alternate test forms that are equivalent in terms of content, response processes and statistical characteristics.

- **Split-half method** split the measure items into two groups, and then calculate the split-half reliability coefficient ($r_a$) by inserting the correlation coefficient ($r$) between scores obtained from the two set of questions [61]. It assesses the internal consistency of a measurement in the statistics and measures the extend of contribution of the test components to the construct that is being measured. This method provides a simple solution to the problem that the parallel-forms method faces: the difficulty in developing alternate forms.

- **Internal consistency** refers to the average of the inter-correlations among all the single test items. It is commonly measured with Cronbach's alpha ($\alpha$).

**Emotional Competence Inventory (ECI)**

The ECI is a 360-degree assessment which provides the broadest perspective on EI according to the emotional competencies identified by Goleman [16]. It is commonly used in organizations for the purpose of employee development. The recent version of ECI 2.0 [56] measures 18 competencies which can be categorised into four factors, self-awareness, self-management, social awareness and relationship management. These competencies are measured by asking participants to rate the target person, as well as by asking the target to evaluate themselves on a scale of 1 to 6 via self-report.

In the recent study [56] of ECI 2.0, the overall average internal consistency coefficient for total others ratings is $0.78$, and the overall average internal consistency coefficient for self ratings is $0.63$. These findings reflect that self ratings are less reliable and consequently less valid, i.e., poor predictor of performance relative to total others' test-retest reliability refers to the stability of a measure over time. In addition, the results suggest that the ECI may be sensitive to change because stability coefficients for the total others ratings were only moderately high, while stability coefficients for self scores were very low [56].

**Bar-On Emotional Quotient Inventory (EQ-i)**

Bar-On Emotional Quotient Inventory (EQ-i) is a self-report measure, which consists of 133 items based on emotional and social behaviour. It is designed to predict the potential performance, rather than performance itself [37]. EQ-i achieves a total EI score from five EI composite scale scores, intrapersonal skill, interpersonal skill, stress management, adaptability and general mood. It provides an estimate of individual underlying emotional and social intelligence. The test-retest reliability of EQ-i is adequate ($r = 0.73$) [37] and internal consistency reliability is excellent ($\alpha = 0.96$) [52]. The details of EQ-i scales and how to assess each scale are demonstrated in Table 2.5.

Table 2.5: The EQ-i Scales and What They Assess (Quote from [48])

| **EQ-i SCALES** | **The EI Competencies and Skills Assessed by Each Scale** |
|---|---|
| *Intrapersonal* | *Self-awareness and self-expression:* |
| Self-Regard | To accurately perceive, understand and accept oneself |
| Emotional Self-Awareness | To be aware of and understand one's emotions |
| Assertiveness | To effectively and constructively express one's emotions and oneself |
| Independence | To be self-reliant and free of emotional dependency on others |
| Self-Actualisation | To strive to achieve personal goals and actualise one's potential |
| *Interpersonal* | *Social awareness and interpersonal relationship:* |
| Empathy | To be aware of and understand how others feel |
| Social Responsibility | To identify with one's social group and cooperate with others |
| Interpersonal Relationship | To establish mutually satisfying relationships and relate well with others |
| *Stress Management* | *Emotional management and regulation:* |
| Stress Tolerance | To effectively and constructively manage emotions |
| Impulse Control | To effectively and constructively control emotions |
| *Adaptability* | *Change management:* |
| Reality-Testing | To objectively validate one's feelings and thinking with external reality |
| Flexibility | To adapt and adjust one's feelings and thinking to new situations |
| Problem-Solving | To effectively solve problems of a personal and interpersonal nature |
| *General Mood* | *Self-motivation:* |
| Optimism | To be positive and look at the brighter side of life |
| Happiness | To feel content with oneself, others and life in general |

Bar-On and Parker [62] also developed a youth version of the EQ-i:YV in order to measure the EI of children and adolescents aged 7-18 years. It is a 60 items self-report measure. Children and adolescents response the questions according to their feelings, thinkings, or behaviours in most situations. The internal reliability of youth version is adequate ($\alpha = 0.65$ to $0.90$) and the three-week test-retest reliability of total EI scales is excellent ($r = 0.89$) [62].

**Trait Emotional Intelligence Questionnaire (TEIQue)**

There are many different versions of TEIQue such as the full form, short form, and child form. The different versions are developed for the different purpose. The full form is a self-report measure designed by Petrides [51] for trait EI models. It provides comprehensive coverage of the sampling domain for trait EI. There are four factors in the TEIQue questionnaire: emotionality, self-control, sociability and well-being. The instrument is predicated on a sampling domain that aims at capturing the affective aspects of personality. The latest version of the long form comprises 153 items, yielding scores on 15 facets, and four factors of the trait EI.

The short form is a 30-item questionnaire designed based on the full form of the TEIQue. Two items from each of the 15 facets of the TEIQue were selected for inclusion, based primarily on their correlations with the corresponding total facet score. The test-retest reliability of the total scales is $0.86$, which is satisfactory [63].

Mavroveli et al. [64] designed the child form which is based on a sampling domain that has been specifically developed for children aged between 8 and 12 years. It comprises 75 items responded to on a 5-point scale and measures 9 distinct facets. The internal consistency of the child form is satisfactory at two times point ($\alpha = 0.76\&0.73$), and the three months test-retest reliability is good ($\alpha = 0.79$).

### 2.1.7 Summary

The first part of EI reviews the theoretical aspect of EI and its development and different conceptualisations. The studies indicate that there is controversy about whether EI should be defined, or as a broad concept which includes abilities, personal traits and social skills. In addition, EI measures developed in parallel with the different theoretical EI models. Ability EI model and mixed EI models were reviewed in this section, and four widely used EI instruments with high frequency use in the related studies were elaborated in relation to the content and the method of assessment. Until now, there is no answer to whose EI model is more representative and which measurement is better. Therefore, it is necessary to clarify the

model of EI for a research project. The following section of this chapter reviews the related studies of EI.

## 2.2 Previous Emotional Intelligence Studies

Previous section has provided a basic understanding of theories, models and measurements of EI. This section is going to review previous studies of EI in relation to contexts such as gender difference in EI, the influence of experience on EI, EI and personality, EI and alexithymia, EI and leadership, and the relationship between EI and project management. This develops an in-depth understanding of what can affect EI and the importance of EI in the workplace, which provides the foundation for the section on Group EI.

### 2.2.1 EI, Gender and Experience

As “Emotional Intelligence” is a hotly debated topic [8], more and more interest has been shown in exploring which factors may affect EI. One possible factor is gender, and a number of papers can be found in relating to emotions and gender [65, 29, 66].

Petrides and Furnham [65] adopted Schutte Self-Report Inventory (SSRI) [29] to assess ability EI, which is a one-dimensional measure of EI based on the original ability EI model developed by Mayer and Salovey [10]. They found that ability EI has no significant difference between genders. Their research shows that females are more likely to have better social skill than males. This result has also been verified in Saklofske et al. [66]. They concluded that there was no significant difference between genders in emotional regulation when using the trait EI model. However, they also concluded that females have better social skills then males, but males have better utilisation of emotions than females. Lyons and Schneider [2] revealed that females tend to score higher than males on all ability EI dimensions of MSCEIT, especially in emotional management. Mehrabian, Young, and Sato suggest that females appear to be more empathetic than males [67], and especially good at classifying facial expressions and distinguishing various emotions [68].

Bar-On et al. [4] also explored the gender difference under Bar-On EI model. They assessed EI with EQ-i and demonstrated that males with higher EI could have higher stress tolerance than females whereas females tended to be more adept at interpersonal relationships than males.

The ECI technical manual [56] found that both of ECI scores of females rated by themselves or by others (males and females) are higher than males rated themselves and by others. However, other researches have found that one gender may be rated higher than the other depending on the particular competencies. Cavallo and Brienza [69] conducted a study with 358 managers in order to find some gender differences. They used the ECI instrument to assess EI, and they summarised that females were rated higher than males by peers on: emotional self-awareness, conscientiousness, developing others, service orientation, and communication. Meanwhile, females were rated higher than males only on adaptability and service orientation by supervisors. Therefore, no significant differences were found between men and women by Cavallo and Brienza.

In addition, as intelligence is developmental (e.g. intelligence can increase throughout childhood and adolescence), Mayer et al. suggest that ability-based EI meets the criteria for a 'standard intelligence' [60]. Furthermore, Goleman [8] also suggests that EI continues to improve and enhance over a lifetime. Hence, Day and Carroll [18] propose that EI should increase with experience. Their findings demonstrate that EI does increase with the development of the experience in emotional perception, emotional integration, and emotional management. Findings from Nelis's study [70] indicate that the group not only can improve their emotional abilities through the training. They also continued to manifest the same marks even after six months of the experiment.

### 2.2.2 EI and Personality

Goleman [71] claims that EI is a "new" construct that differs from previously developed constructs. However, Davies argues that EI is merely a collection of personality traits [72]. Meanwhile, a number of studies have shown that trait EI has

correlation with the Big Five factors of personality (which are defined as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism.) [52, 38]. Dawda et al. [52] revealed that the scales of EQ-i have large significant correlations with extraversion (positive) and neuroticism (negative), and have smaller significant positive correlations with openness, agreeableness and conscientiousness. This result has also been demonstrated in the study of Petrides and Furnham [38]. Therefore, the correlation between trait EI and personality raises a problem with the distinctness of trait EI from the personality domain. One way to assess this issue is to examine its incremental validity in the prediction of life outcomes [66], i.e. its ability to predict outcomes when the effects of personality are controlled for. Whereas other researchers were concerned that self-report EI measures needed to demonstrate discriminant validity from personality measures [73].

As trait EI concerns personality traits instead of cognitive ability, Petrides et al. [39] believe that trait EI may have a higher correlation to personality than ability. Thus, they examined where trait EI is located in the Big Five factor space for 274 students (92 males; 182 females) in Greece. They used the TEIQue to assess the trait EI, and used the Traits Personality Questionnaire (TEXAII) to measure the Big Five personality. Petrides et al. hypothesised that trait EI would be a reliable predictor of all dimensions of personality [39]. The findings show that as regarded to the personality dimensions, trait EI has positive correlations with extraversion, openness to experience, conscientiousness, and agreeableness. Meanwhile, trait EI negatively correlates with neuroticism. In order to establish the incremental validity of global trait EI with regard to the Big Five factors, the study also utilised the standard multiple regressions analysis. The findings display that trait EI was a reliable predictor of personality and 'life satisfaction'. In addition, the results from factor analysis (which is a statistical method for accounting for the correlations amongst a large number of variables with a smaller number of underlying dimensions [32].) of TEIQue facet scales and personality scales indicate that trait EI can be isolated in the personality space, and trait EI is distinct from personality. Moreover, trait

EI is a compound construct that lies at the lower levels of personality, as it is partially determined by several personality dimensions. Trait EI is related to Big Five factor space, rather than irrelevant to it. This result was also verified in the study from Saklofske et al., [66]. Saklofske et al. found that EI negatively and significantly correlated with neuroticism, and positively and significantly correlated with extraversion, openness, agreeableness and conscientiousness. The regression analysis shows that trait EI accounted for variance in the measures not accounted for personality. The construct of trait EI and the construct of personality is distinct, although strongly correlated.

Day and Carroll [18] examined the relationship between the MSCEIT instrument of ability EI and the Big Five factors of personality. They made a number of conclusions. Openness to experience was the only personality scale that was related to all four MSECIT scales. Conscientiousness was unrelated to all four MSCEIT scales. Extraversion was related to emotional understanding and integration. Agreeableness was only related to emotional management. Neuroticism was only related to emotional perception. Therefore, this study states that ability EI has a low correlation to personality and ability EI is distinct from personality. As ability EI has a stronger relationship with traditional intelligence, it concerns cognitive ability. Thus, ability EI has a low correlation with personality.

These results are important because they support the criterion validity of trait EI construct and expand its nomological network. It is related to almost all of the criteria. That means people's appraisal of their circumstances and their reaction to life events may be partly filtered through perceptions of emotional ability, and it gave clear evidence of the incremental validity of trait EI and ability EI. Compared to Day and Carroll's study, Petrides utilised a more complicated way of approaching EI is distinct from personality.

EI as an ability to identify, assess and control the emotions of oneself, of others and of groups, its construct is related to personality, but distinct from the personality. People with high EI are more likely to realise and understand their emotions

and others' emotions. They usually have more traits of extraversion, openness, agreeableness and conscientiousness. In contrast, if people feel difficult to perceive emotions, or to identify and describe emotions, these feelings are related to another topic - *Alexithymia* [74]. Comparing with the studies of relationships between EI and personality, alexithymia is another hot topic which related to EI.

### 2.2.3 EI and Alexithymia

A growing number of studies reveal that trait EI can affect personality and other emotion-related variables such as Alexithymia. Alexithymia is defined by Sifneos [74] as

> *A personality construct characterised by the sub-clinical inability to identify and describe emotions in the self.*

"Difficulties in identifying and describing subjective feelings, a limited imagination capacity, and an externally oriented style of thinking are the three main salient features of Alexithymia" [75, 76]. Much research has been carried out to investigate the relationship between these aspects and EI.

Parker et al. [77] explore the ability to identify emotions in others using facial expressions. A number of photographs containing the facial expressions of nine different emotions, were presented to participants. The participants were asked to identify the emotions in the photographs. The results show that it was difficult for individuals with alexithymia to accurately identify the emotions from the facial expressions. Their results also suggest that difficulty in identifying emotions from facial expressions is proportional to the severity of alexithymia. In addition, other research on this topic shows empirical evidence that alexithymia is associated with difficulties in discriminating different emotional states [78], and a limited ability to think and use emotions in stressful situations [79, 80].

As Salovey and Mayer acknowledge that there is an overlap of the EI and alexithymia constructs [81], Parker et al., [80] examined the further relationship between the alexithymia and the Bar-On model of EI. They concluded that EI and

alexithymia are independent of each other, but they are strongly and inversely correlated. Their findings reflect that people with low EI are more likely to have alexithymia. Furthermore, males were more likely than females to have alexithymia in the form of difficulties in describing feelings and externally oriented thinking. Moreover, compared with males, females are more skillful at understanding others' emotions and desires. Such findings also support Saklofske's study [66], which reveals that lower levels of EI and its four components are associated with higher levels of alexithymia and its salient features. This result can alert clinicians and researchers to recognise that highly alexithymic individuals not only lack the ability to use emotions to guide their behaviour, but also endure less stress and have limited adaptive skills. A similar correlation between trait EI and alexithymia has also been demonstrated in the study from Saklofske et al., [66]. In addition, Saklofske et al., found that trait EI and alexithymia are two distinct constructs from the evidence of factor analysis.

These two sections provide the understanding of the difference between EI and personality, and the difference between EI and alexithymia. The findings suggest that they should be regarded as distinct but related construct, i.e. alexithymia is not merely the low pole of EI, or EI is not a simple mixture of personality traits. EI, personality, and alexithymia, they are three distinct constructs, although there are correlated. The following section aims to discuss the role and importance of EI in the workplace, especially focus on various relationships between EI and work-related outcomes. In order to explore this, it develops a comprehensive understanding of how EI affects individual behaviour and work performance, which can be applied to the context of project management.

### 2.2.4 EI and Leadership

There is disagreement between researchers on what leaders are like, what they do, how they motivative their followers, and how they can make major changes in their organizations [82]. Currently, it is widely accepted that leadership is a process of social interaction where the leader's ability to influence the behaviour of their followers can strongly influence performance outcomes [83, 84]. In order to

investigate the implications of EI for leadership, it is necessary to understand the fundamental nature of effective leadership. Based on the studies from Locke [85], Conger and Kanungo [86], and Yukl [87], specific features of effective leadership can be identified as following [82].

- Developing of a collective sense of goals and objectives and how to achieve them.
- Instilling in others knowledge and appreciation of the importance of work activities and behaviours.
- Generating and maintaining excitement, enthusiasm, confidence, and optimism in an organization as well as cooperation and trust.
- Encouraging flexibility in decision making and change.
- Establishing and maintaining a meaningful identity for an organization.

Recent research [88, 89] also shows that the leader's emotions could affect the group members' emotions and substantially affect members' attitude, behaviour, and performance. Dansereau et al.,[90] suggest that leaders could influence their group members' performance through supporting their positive feelings. Likewise, Wong and Law [88] conducted an exploratory study on 60 middle and upper-level managers enrolled in a part-time management diploma course at Hong Kong university. They demonstrated that leaders with high EI are more sensitive to their own emotions and those of their followers. Meanwhile, leaders have an impact on their followers' attitudes, behaviours and performance. Goleman [16] indicates that EI accounted for 67% of the abilities deemed necessary for superior performance in leaders and mattered twice as much as technical expertise or intelligence quotient (IQ). Meanwhile, Goleman [91] stresses that *"the foremost job of leaders today is to drive the collective emotions of their organisations in a positive direction and to clear the smog created by toxic emotions"* (p.5). This is also demonstrated in

McColl-Kenney and Anderson [92], who investigate that leaders have a strong impact on their team members' feelings in terms of frustration and optimism, and subsequently their performance.

Pescosolido [93] observed 20 different groups, which was followed by whole-group critical incident interviews with each of those groups. The results indicate that the leadership is able to influence the process of managing subordinates' emotions, resulting in improved performance. Stubbs' and Wolff's study [94] of 81 teams (422 people) in a military organisation demonstrates that the team leader's EI will influence the development of group level emotional intelligence (Group EI, this will be reviewed in section 2.3). The findings shows that the team leader's EI is significantly related to the presence of emotionally competent group norms in the teams they lead, and subsequently emotionally competent group norms are related to group performance. The team leader's EI has a direct influence on the group performance. As a result of correlation and regression analyses in the study from Rosete and Ciarrochi [7], higher EI is associated with higher leadership effectiveness.

Kerr and Garvin [95] investigated 38 supervisors and 1258 employees within a large manufacturing organisation in order to investigate the impact of ability EI on leadership. The findings present that emotional perception and emotional facilitation of MSCEIT scores have the significant positive correlation with supervisor ratings. However, emotional understanding and emotional management have the low correlation with supervisor ratings. The study suggests that an individual's EI could be a predictor of leadership effectiveness. Furthermore, this result indicates that supervisor's ability to understand and manage their emotions does not play a key role in determining how they are viewed and rated by their subordinates.

The results reviewed above present the influence of leader's EI in the teamwork. Except the study of Pescosolido's case samples, all of other studies utilise the quantitative implementation. Wong and Law [88] argue that no relationship between the EI of leaders and the job performance of their followers can be found.

This potential problem is also suggested by McColl-Kenney and Anderson [92]. Rosete et al., [7] also argue that the amount of samples is small in their study. It is possible to investigate the relationship between EI and leadership in larger samples and across different industries. It will also be important for researchers to evaluate the ability of EI to predict future performance.

Stubbs' and Wolff's study [94] is the only study on the influence of leader's EI on the teamwork. The author advised that research should examine the relationship between team leader's EI, Group EI, and group effectiveness with a sample comprised of industry teams. Pescocolido [93] also claimed that a link between a leader's EI and variables such as leader personality, organizational characteristics, group performance should be investigated. Most leadership theory, particularly charismatic/transformational leadership theories, focus on leadership as a dyadic process rather than as a process involving a whole, interacting group [96]. That is, most leadership theories focus on the relationship between the leader and an individual follower. However, these theories ignores the fact that both leader and follower are individual members of a larger group. Yukl [96] suggests that it is important to understand how leaders influence group processes "because they are necessary to explain how a leader can influence the performance of an interacting group" (p. 295).

Other researches conduct the relationship between EI and transformational leadership. Transformational leadership is described as guidance in the teamwork through individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence [92]. In general, transformational leadership behaviour can be considered as an effective style of leadership, which leaders encourage their followers to learn, achieve, and develop [32]. Barling [97] found that managers who score high on the EQ-i inventory are perceived by their followers as displaying more transformational leadership behaviours. Similarly, Gardner and Stough [98] conducted another EI research with effective leadership behaviours in upper level management. The findings show a strong correlation between all components of transformational leadership and overall EI. The scales of emotional understanding

(external) and emotional management are the best predictors of this style of leadership. More recently, the results of Butler and Chinowsky's study [6] indicate a strong relationship between EI and transformational leadership behaviour, which study completed an EI research on upper-level managers of construction industry. Particularly, Butler and Chinowsky suggested that the empathy and interpersonal relationships could be two important predictors of transformational behaviour.

### 2.2.5 EI and Project Management

In most of the organisational management literature, research has revealed that an individual's emotions cannot be avoided if that individual is part of the organisational life [87, 9]. In the case of interpersonal relationships in the workplace, there are an increasing number of studies investigating the value of emotions in management practice. The subject of emotions in the workplace has became the hottest topic in the project management domain [23]. Before reviewing the relationship between EI and project management, an introduction of project management, project manager and work performance provides a basic understanding of their differences. Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives within the given constraints (which was described by Project Management Institute (PMI), with world headquarters in the United States). Project manager as a professional role in the field of project management, is a person takes responsibility for for accomplishing the project objectives through management process. Project management is the responsibility of a project manager, and work performance is the outcome of the project management.

A number of studies demonstrate that EI has a positive impact on the relationship between managers' and employees' work outcomes. Carmeli [99] reveals that managers with high EI level are more likely to facilitate positive work attitudes and behaviours. Fredrickson [100] suggests that managers with high EI are able to improve their employees' performance by managing employees' emotions for the purpose of creativity, resilience and confidence. Furthermore, the findings of Zhou and George [101] claim that managers with high EI are more likely to use emotions

to establish cognitive processes, to identify problems, and to catch opportunities. Likewise, Barsade [102] demonstrates that high EI managers are more likely to facilitate more positive interactions between employees for better cooperation and coordination.

According to the study of Wong and Law [88], employees with high EI tend to perform the job with higher satisfaction as they can assess and regulate their emotions better than employees with low EI. Furthermore, managers with high EI are able to help employees with lower EI to recognise and regulate their own emotions and others' emotions. Specifically, employees can benefit from a manager with high EI because such manager is better at improving the work environment.

Goleman [8] made a strong claim about impact of EI on individual's success in the workplace. He identified that intellectual intelligence only made $20\%$ contributions towards life and work success. The remaining $80\%$ was contributed by EI. But, he abandoned this unsubstantiated claim in his later work [24]. The reason was that his claim was made based on individual profiles, and observations of individual success and work performance [8]. All findings involved in this study were not tested by EI measurements, nor were a systematic measurement of individual success or work performance.

However, Mayer and Salovey [10] agreed that intellectual intelligence made $10 - 20\%$ contribution towards life success, which was defined as academic achievement and occupational status. The findings of their study [57] supported this claim, which demonstrated that intellectual intelligence had correlation with various indicators of life success (around $r = .45$). Martin [103] also noted that sometimes people's success was not only depend on their knowledge and skills, but also depend on their abilities to manage their social and emotional skills in communications. Although there is no one unified research finding in all of these studies to evidence how EI influences performance, these studies reveal that EI is one of the stronger indicators which can determine an individual's success and work performance.

### 2.2.6 EI and Conflict Resolution

Organizational environment is such a place where individuals are working together in order to achieve organizational and personal goals. In some situations, if there is a disagreement between group members for a shared objectives, individual's own attitude, values, beliefs, and behaviour guided by emotions may become the reasons for conflicts to take place [104]. Thus, there are some studies investigate whether or not the emotional ability of individuals can reduce or manage the conflict in the workplace.

Jordan and Troth [105] investigated 139 participants and found that individuals with high emotional intelligence preferred to seek collaborative solutions when confronted with conflict. Another study from Jordan and Troth [106] investigated 350 university students working in 108 teams in order to explore the relationship between team members' EI and conflict resolution. Participants were required to complete a problem-solving task individually as a team member, and afterwards reflected on the conflict resolution tactics used to achieve the team outcome. Examining specific conflict resolution strategies used during the team problem solving exercise, the results show that there was a negative correlation between avoidance and the ability to deal with one's own emotions, but not with the ability to deal with others' emotions. This result means that the conflict strategy relies most on an individual's ability to deal with the opinions and rights of others. In addition, Schlaerth, Ensari and Christian [107] carried out a meta-analysis (20 studies) on the subject of EI and constructive conflict management. The results present that EI is positively associated with constructive conflict management, and this relationship was stronger for subordinates than leaders.

### 2.2.7 Summary

The second part of EI literature review focuses on the what affect EI, relationships between EI, personality and alexithymia, and the impact of EI in the workplace. The findings of various relationships between EI and work-related outcomes lead to one research gap: how leader's EI affect group process, and what is the link

between leader's EI and group performance. With regards to the studies focus on the influence of individual EI on group performance, the following section will focus on EI at the group level. For example, developing an group emotional intelligence, and exploring the relationship between group emotional intelligence and group performance.

## 2.3 Group Emotional Intelligence

When working in a group, emotion is fundamentally connected to the group members' interaction and teamwork [9]. The ability of a group to intelligently perceive and understand other members' emotions plays an important role in teamwork [9]. Therefore, developing the concept of Group EI and its measurement is vital. Based on the knowledge of EI, this section looks into the existing researches on Group EI, which includes the concept, construction and assessment of Group EI.

### 2.3.1 The Definition of Group

A group is defined as a collection of individuals who coordinate their individual efforts to achieve a common goal or objective [108]. The term 'group' can be referred to any collection of individuals depending on what type of work and task they perform as well as the background of individuals. A collection of individuals can form a family group if they are all family members, a friends group if they are all friends, a worker group if they are all workers. Such examples can go on endlessly. However, there is another term which bears similar meaning to 'group' and is usually used by other researchers to describe a similar concept to the term 'group'. In other word, they are interchangeable. Such term is 'team' which also describes a collection of individuals who are organised to work towards a common goal or objective. The commonalities between 'group' and 'team' include that they both have more than one persons; they both involve the interaction between members; they both focus on achieving an objective; they both have leader(s); and they both share information and resource. However, there are some fundamental differences between these two terms as summarised in [108]. A group is usually organised based on individuals' commonality (e.g ethics, type of job, etc.) whereas a team is

usually specifically organised with the consideration to maximise the outcome. For example, a football team and a hobbyist group are both referred to a collection of peoples who work together. The football team's objective is to win the race while the hobbyist group's objective can be to share the knowledge between members. The members in the football team are carefully chosen for a specific position based on their ability so that it can maximise the performance to win the race. On the other hand, the members in the hobbyist group are organised because they all have the same hobby and want to talk to each other. Such example also leads to the other difference between 'group' and 'team': share responsibility. A team usually shares the responsibility between members (e.g fans usually blame the football team did not play well instead of a specific player if the team lost the race) whereas a group usually does not share the responsibility (e.g usually only the person who did not wish to share knowledge will be blamed instead of whole hobbyist group).

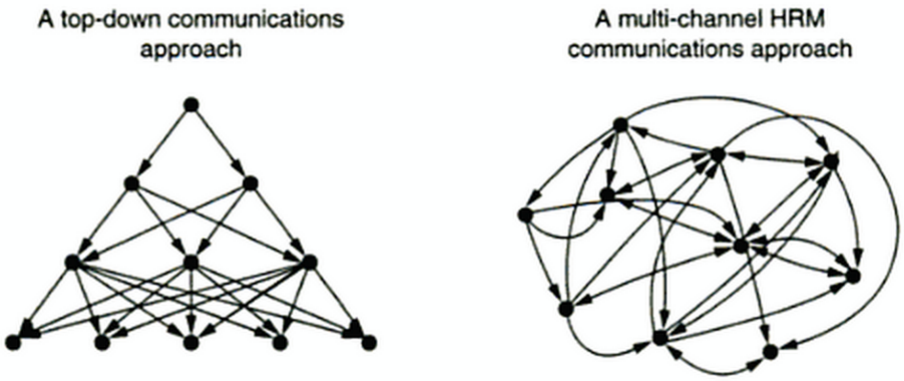
As there are many commonalities between 'group' and 'team' but also some differences between them, whether these two terms are interchangeable in one research is depending on the scope of the specific research. In the scope of this research as well as in those literatures where these two terms are interchangeable, they all focus on the interaction between members (e.g EI or Group EI) and the achievement of an objective (e.g group performance). None of them actually focus on whether the members' abilities meet the requirements of the tasks, or finding the person who should be responsible for the outcome. As a consequence, these two terms are interchangeable, which is also applicable to this research. Thus, the rest of this thesis will use the term 'group' to unifying the representation and to avoid confusion.

### 2.3.2 The Communication Approach Within A Group

Dransfield [109] proposed that there are normally two communication approaches within a group (as demonstrated in Figure 2.1). These are the top-down communication approach and the multi-channel human resource management (HRM) communication approach. Most studies of Group EI and group performance are based on these two communication approaches.

A top-down communication approach issues communications, instructions and information within a business in a hierarchical structure. Such approach depends on leadership which controls the flow of information and ensures that each group level only has the essential information needed to complete relevant tasks. This reduces the risk of group members focusing on irrelevant information or details. However, this also results in no checks and balances system to ensure all levels are receiving the correct information.

Figure 2.1: Two communication approaches within a group




In comparison to to the top-down communication approach, multi-channel HRM communication approach is a method of opening up channels of communication within a group. This requires the leader to develop the skills and abilities to encourage group members to communicate with each other so that they can share and understand others' idea.

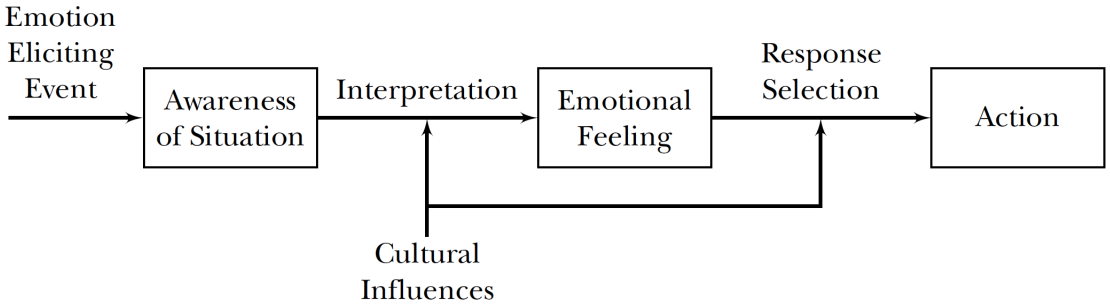
### 2.3.3 Emotions in Group Context

When it comes into the context of a group, emotions can be considered as an event-interpretation-action loop (known as EI Process) between group members. As shown in Figure 2.2, when an emotion eliciting event happen, members in the group should initially be aware of the existence of such event. Then, depending on the interpretation of such event, different emotional feeling will be developed by each group member, which subsequently decides the selection of the response to such event and the action being taken to handle such event. The action taken to

handle the emotion eliciting event may then lead to another emotion eliciting event, which form an EI process loop within the group.

This model helps people to understand the role which the emotion plays in work group. The important information involved in emotions can alert group members to focus on the group's attention and response [110]. In addition, this model explains the connection between emotion and behaviour. Folkman and Lazarus [111] propose an emotional cycle according to this connection. Emotion change can lead to behaviour changes. The behaviour changes can then lead to a change in the relationship between group members. Ultimately, the change in the relationship between group members will lead to a change in the emotion.

Figure 2.2: Emotional Intelligence Process (Quote from [9]).




There are many factors that may affect the EI process or the emotional cycle. Levy [112], an anthropologist, gives an good example to this context. In his research [112], he concluded that culture plays an important role in the interpretation and management of emotion. He suggests that an individual interpretation of an emotion-eliciting event is shaped by culture which also influences the response selection. In an organisation, especially in international companies, group members may come from different countries with different cultures. For the same situation, they could have different response, and subsequently different behaviours due to the culture difference. This will result in the disagreement or culture conflict. It is necessary for the group to come up with a resolution to the conflict. In this case, a group with high EI or low EI could have different resolutions with different effectiveness. Therefore, developing the concept of Group EI and its measurement is vital

to estimate the group's ability to solve the conflict.

### 2.3.4 The Definition of Group Emotional Intelligence

Group EI is based Daniel Goleman's [8] framework of awareness and regulation of emotion at multiple levels but it should not be confused with individual emotional intelligence. The "intelligence" in a team comes from the patterns of behaviour, or norms, that develop as the team goes about its task. Group EI is a team-level construct and is very different from the individual-level emotional intelligence of team members. Thus, Druskat and Wolff [9] defined Group EI as:

> *the ability of a group to generate a shared set of norms that manage the emotional process in a way that builds trust, group identity, and group efficacy.* (p.139)

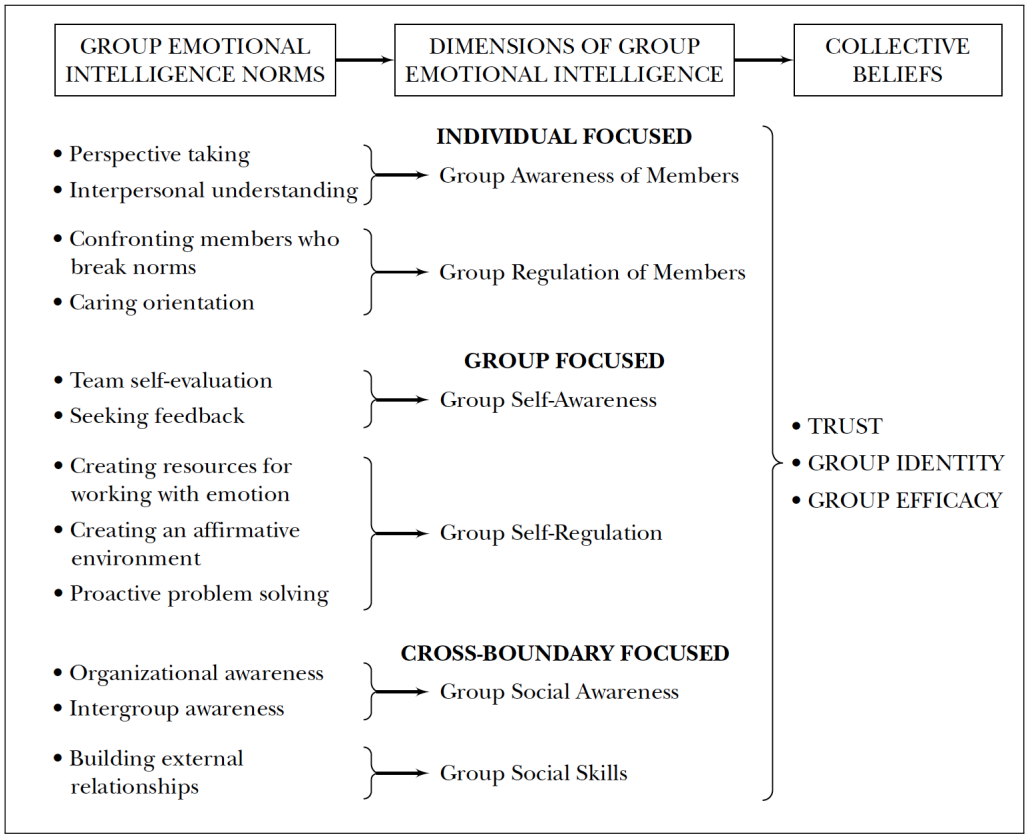
Combining the definition of Group EI and the EI process or the emotional cycle introduced in previous section, it can be said that the group norms have an influence on the interpretation of the emotion eliciting event as well as the selection of behavioural response to such event. A group with higher Group EI is more capable to develop or to agree on a set of norms which regulate emotions and an awareness of emotional information in a group. According to Goleman's perspective (Section 2.1.1), high EI means an individual has an awareness and ability to regulate emotions. This awareness and regulation are both involved in intrapersonal and interpersonal interaction. Thus, Druskat and Wolff [9] propose Group EI focuses on three distinct levels: individual level, group level and cross-boundary level.

Druskat and Wolff [113] initially designed 13 norms that represented the set of behaviours observed in emotionally competent teams. Subsequently, they adjusted 13 norms to 12 norms, which dimensions are illustrated in Figure 2.3 [9].

A definition of Group EI proposed by Gantt and Agazatian [114] provides a different understanding of Group EI. They defined Group EI as:

> *a system's ability to discriminate and integrate information energy (cognitive and emotional) in the service of the goal of the context.* (p.162)

Figure 2.3: The Dimensions of Group EI (Quote from [9]).




These two definitions of Group EI provide the understanding of Group EI for the future study. In the definition from Druskat and Wolff [9], Group EI is a function of the individuals in a group that leads to the successful implementation of group tasks and challenges by developing the group's norms. On the other hand, Gantt and Agazatian [114] advocate a system perspective to understand EI in the organization. Moreover, Group EI is more than a function of the individuals in the group. It is a collective process that allows the system to be aware of its relation and purpose with a larger organisation system as well as the interaction between different groups [115]. This research focuses on the Group EI with individuals in the group. Thus, the next sections in-depth explain the Group EI of Druskat and Wolff [9].

### 2.3.5 Managing Emotion in the Individual Area

Williams and Sternberg [116] found that individual emotion will influence the quality of group performance. For example, even if only one group member is overly zealous or domineering, this would inhibit other member's behaviour in the way the

group works together. This might be because of *emotional contagion* described by Hatfield [117] as *"when people unconsciously mimic their companions' expressions of emotion, they come to feel reflections of their partner's emotions"*. Hence, the first set of Group EI norms to consider is individual emotion. Individually focused Group EI can be divided into two elements: Group Awareness of Members and Group Regulation of Members.

- **Group Awareness of Members**

  Previous research [118, 119] suggests that there are two interrelated Group EI norms that can facilitate member awareness of others' feelings, needs and concerns: *Perspective taking* and *Interpersonal understanding*. Perspective taking refers to the willingness of a group member to consider the opinions of other group members, whereas interpersonal understanding refers to the ability or the willingness of a group member to understand the opinions of other group members. For a group to resolve problems or conflicts between group members, it is of paramount importance that the members can listen to and understand others' opinions. Similarly, if a person's opinion can be listened to and understood by other group members, it is easier for that individual to build trust in the group and become more willing to listen and to understand others' opinions. According to Druskat [120], members of a high-performing self-management team have a higher interpersonal understanding level than members of a low-performing team.

- **Group Regulation of Members**

  Druskat [120] asserts that members who break norms are confronted more often by high-performing self-managing groups than by low-performing groups. This is fair for other members and beneficial for balancing group member behaviour. Thus the first norm in this dimension is *confronting members who break norms*.

  Wolff [121] found that encouraging a caring orientation in a group by increas-

ing members' safety, cohesion and satisfaction will influence group effectiveness. So the second Group EI norm in this dimension is *caring orientation*.

### 2.3.6 Managing Emotion in the Group Arena

Barsade et al [122] claim that the group construct can be greater than the sum of its individual parts. They propose that the group atmosphere strongly influences group members' behaviour. Returning to Figure 2.2, two dimensions of Group EI are proposed in the group arena [9]: Group Self-Awareness and Group Self-Regulation.

- **Group Self-Awareness**

  As a key social competence in Goleman's theory (Section 2.1.1), the definition of Self-Awareness is

  > *knowing one's internal states, preferences, resources and intuitions.* [16] (p.26).

  Therefore, Druskat and Wolff propose that group self-awareness is awareness of the group emotional state, preferences and resources [9] (p.145). *Team self-evaluation* and *Seeking feedback* are two main Group EI norms in this dimension.

  *Team self-evaluation* is a group's ability to evaluate its emotional states, and the strengths and weakness of members in interactions and operation as a team. There is empirical evidence to show that a team with self-evaluation is more effective than a team without self-evaluation [120].

  *Seeking feedback* is achieving feedback from external resources. Nadler [123] considers feedback to bring positive changes to a group in 37 laboratory studies, because its impact on motivation and keeping attention on important issues improved group behaviour.

- **Group Self-Regulation**

  Using the definition by Mayer and Salovey (Section 2.1.1), Druskat and Wolff define group self-regulation in Group EI as:

  > *Group self-regulation is the ability to regulate itself in order to promote group emotional well-being and development.* [9] (p.146).

  To do this, the Self-Regulation dimension must work in partnership with Self-Awareness.

  Creating resources for working with emotion can help group members to examine and cope with their feelings. As previously discussed regarding group atmosphere, creating an affirmative environment will have a positive influence on group behaviours and group outcomes. Druskat also found that highly effective teams were more likely to use proactive problem solving than less effective teams. Thus Creating resources for working with emotion, creating an affirmative environment and proactive problem solving are the three main Group EI norms proposed in this dimension.

### 2.3.7 Managing Emotion in the Cross-Boundary Arena

The research claims that effectiveness in groups also needs a network of relationships within and external to the group [120]. So the third arena of is managing emotions in the cross-boundary area. This requires the ability to be aware of the feelings, needs and concerns of individuals and groups in the external boundary.

- **Group Social Awareness**

  Druskat [120] concludes that a team must understand the needs and expectations of the broader organisational system and understand whom it will affect. He found that high-performing teams had a better understanding of the organisation's culture than low-performing teams. This understanding is useful for the team to understand when they need external resources, and understand decisions made by the team managers. So, *Organisational awareness* is the first Group EI norm in this dimension.

Argote's study [124] of 30 hospital emergency units found that the most effective units have a higher level of intergroup agreement. So, *Intergroup awareness* is the second Group EI norm in this dimension.

- **Group Social Skills**

In the real world, a group must have the skills to develop a relationship that helps them to achieve external resources. Druskat and Wolff [113] propose that *building external relationships* is the norm in this Group EI dimension. This is also demonstrated in Druskat's study [120], a highly effective team has a good relationship with other teams.

### 2.3.8 Collective EI and Group EI Confusion

When searching the literatures in the topic of EI in group context, there are a very small number of papers [125, 21, 115] mentioning the term 'Collective Emotional Intelligence' or 'Collective EI'. Through going through these papers, it appeared that there is some confusion between Collective EI and Group EI. For the latest paper mentioning Collective EI from Curseu et al. [125], they defined Collective EI by summarising the definition from Druskat and Wolff [9] as:

> the ability of group to develop a set of norms that promote awareness and regulation of member and group emotions.

In comparison to the Group EI definition from Druskat and Wolff [9] in Section 2.3.4, it can be seen that both definitions emphasise on the generation or development of a set of norms which are acceptable within the group. Such norms can then be used to manage the emotional process by building the trust, group identity, and group efficacy so that it can promote awareness and regulation of member and group emotions. On top of this, based on the fact that Curseu et al. quoted Druskat's and Wolff's work for their definition of Collective EI, it is believed that the Group EI and Collective EI are equivalent in this paper despite two definitions use slightly different wordings.

In a slightly older paper from Ghuman [115], the author intended to review and re-conceptualise Group EI. The author used the term 'GEI', which is the abbervation of 'Group EI', throughout the paper. However, during the review, the author mentioned the term 'collective EI' as below [115]:

> Ashkanasy (2003) first posited this idea of a collective EI that is greater than the sum of its constituent individual intelligences.

By going through the paper from Ashkanasy [21] as referenced by Ghuman, it become clear that the term 'collective EI' used in Ghuman's paper is actually referring to a point made by Ashkanasy as below [21]:

> emotionally intelligent teams can be more than just a collection of emotionally intelligent individuals.

In other word, the point made by Ashkanasy is that a group comprised of many emotionally intelligent individuals does not necessarily mean such group will be more emotionally intelligent. There are other factors which can play a role in deciding how emotionally intelligent a group is, which actually supports the hypothesis of the thesis presented here. Then, for the definition of an emotionally intelligent group, Ashkanasy adopts the Group EI definition by Druskat and Wolff.

By summarising the review above, the term 'Collective EI' has appeared in some literatures and may cause some confusion that 'Collective EI' is another definition of emotional intelligence in group context. However, by reviewing existing literatures that mention the term 'Collective EI', it can be concluded that it is either equivalent to the definition of Group EI but with some different wordings, or some authors happened to use such words to state their claim in the paper. It is hoped that such term will not cause further confusion.

## 2.4 Measures of Group Emotional Intelligence

Group EI represents the ability of a group to understand and deal with emotions. It is the whole group's feelings and the behaviours rather than one person's feelings and behaviours within a group. It is difficult for the researcher to capture the

dimension of the elusive feeling arising from group dynamics [122]. The questions, "can Group EI be measured" and "how should Group EI be measured?" should be solved first in the Group EI studies. In addition, Druskat and Wolff [9] assert that it is not enough to use individual EI to estimate EI in a group. Instead, there has to be a new measurement which can measure EI in a group context. Group Emotional Intelligence Norms (Group EI Norms) and Workgroup Emotional Intelligence Profile Short Version (WEIP-S) are the two most commonly used Group EI measurement approaches.

### 2.4.1 Group Emotional Intelligence Norms

Based on 12 norms in Figure 2.3, the items in the current version of the survey represent a process of continual refinement based on the study of Hamme [126] and the study of Druskat and Wolff [9]. In the newest Group EI norms survey, some items were deleted depended on the factor analysis if they did not load on the appropriate factor [25]. Furthermore, based on the work [25] and feedback from participants, items were reworded in order to improve clarity and relevance of the items. The current Group EI norms survey can be summarised into 9 norms with 57 items that guide group interactions with its members (individual level), the group as a whole (group level) and others outside the group (cross-boundary level), as shown in Table 2.6.

The Group EI norms survey is a group-level measurement. That means that most of the members in a group need to fill out the survey for the information to be considered a valid measurement of Group EI. Wolff [25] suggests that a minimum of $75\% - 80\%$ of the group members need to fill out the survey when he consider the valid of survey. The Group EI norms survey has been developed as a result of interactions within group members, the survey itself is not necessarily focused on emotions. It also can be used to guide and regulate group behaviours for the purpose of high group emotional outcomes [25]. Thus, the results of the survey can be used to help group members to understand and focus their behaviours in teamwork. In Wolff's study [25], the average reliabilities for all 9 norms are $.823$. However, for the copyright and intellectual property rights reason, the authors do

Table 2.6: Group Emotional Intelligence Norms (Quote from [25]).

| 3 levels | 6 Dimensions | 9 Norms |
|---|---|---|
| Individual | Group awareness of members | Interpersonal understanding |
| | Group management of members | Comforting members who break norms. |
| | | Caring behaviour |
| Group | Group self-awareness | Team self-evaluation |
| | Group self-management | Creating resources for working with emotion |
| | | Creating an affirmative environment |
| | | Proactive problem solving |
| Cross-boundary (External) | Group social awareness | Organisational understanding |
| | Group management of external relationships | Building external relationships |

not publish more details of the Group EI norms survey.

### 2.4.2 Workgroup Emotional Intelligence Profile(WEIP)

According to the initial EI model proposed by Mayer and Salovey [10], EI was defined as emotional awareness (own and others), emotional management (own and others), emotional understanding and emotional facilitation. Afterwards, other EI models were developed based on this initial construct such as Goleman's model. Meanwhile, the common dimensions they defined were the abilities of emotional awareness and the abilities of emotional management. Subsequently, Holahan and Amason [127] argued that emotional interaction was essential at a group level to enhance relationships within the group members. Consequently, apart from Druskat's and Wolff's Group EI model [9], Jordan and Lawrence proposed another Group EI model which focused on the abilities relating to individual emotions and the abilities relating to others' emotions in teamwork with four dimensions. Which model is demonstrated in Figure 2.4. Furthermore, based on Jordan and Lawrence's Group EI model, Jordan and Lawrence [20] developed the Work Group Emotional Intelligence Profile (WEIP) to assess Group EI. I is a self-report measurement designed specifically to profile emotional intelligence of individuals in a team.

### Awareness of own emotions

Awareness of our own emotions is the ability to perceive one's own emotions and the ability to respond to their own emotions. It requires individuals to be able to understand emotions and to describe the feelings and emotions they are experiencing. For example, when a group member is annoyed by other members, whether he/she can aware that he/she is in a negative mood and what causes the negative mood is known as the awareness of own emotions. The measurement of this dimension can be achieved by asking the respondents to which degree they are able to aware and describe their own emotions [128].

### Management of own emotions

Management of own emotions is the ability to control or redirect disruptive impulses and moods so that it can minimise the negative impact of one's own emotions on other people. For example, when a group member feels unhappy with another member's progress or the work outcome, how he/she handle the unhappiness is known as the management of own emotions. The measurement of this dimensions is achieved by asking the respondents what they will do when they have developed a negative emotion [128].

### Awareness of others' emotions

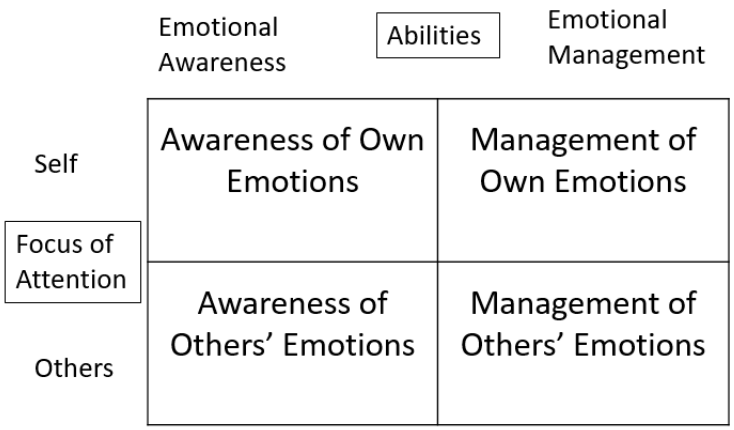
Recognising others' emotions and understanding others' emotional expressions is a fundamental ability in dealing with others [10]. This skill has been most commonly manifested in an individual's ability to understand others' faces and body language [129, 130]. The measurement of this dimension can be achieved by asking the respondents to which degree they are able to aware and describe others' emotions [128].

### Management of others' emotions

The impact of managing others' emotions is ensuring that working relationships are maintained. Research has evidenced that encouraging positive emotions, such as

enthusiasm, may result in positive interactions between team members and positive team emotional outcomes [102]. It can be measured by asking respondents to reflect on their contributions to creating a positive environment in a team [131].

Figure 2.4: A Model of Emotional Intelligence Abilities in Teams [128].




WEIP is a measure of Group EI that reflects the emotional intelligence ability and reveals behaviours in work teams. WEIP uses a Likert scale questionnaire, and it is adjusted to different versions according to the number of questions and different purposes, such as the short version of the WEIP (WEIP-S). WEIP-S [128] is a instrument with high frequency used in related studies. It is a 7-point Likert scale self-report measure (1 = strongly disagree; 2 = disagree; 3 = disagree somewhat; 4 = undecided; 5 = agree somewhat; 6 = agree; 7= strongly agree), which includes 16 items in total. WEIP-S consists of four items in each ability, and takes approximately 15 minutes to complete. For each item, participants are encouraged to reflect on one's own behaviour, such as "I am aware of my own feelings when working in a team" and "I am able to describe accurately the way others in the team are feeling." A high score indicates a higher level of EI in the group. Jordan and Lawrence [17] demonstrate that the test-retest reliability of WEIP-S is good, with average reliability of 0.82.

### 2.4.3 A Comparison of Group EI Norms and WEIP

WEIP and Group EI survey are two distinct questionnaires. Group EI survey [9] is designed based on the Group EI model of Druskat and Wolff. It a set of norms that

Table 2.7: A Comparison of Group EI norms and WEIP-S

| | **Druskat and Wolff** | **Jordan and Lawrence** |
|---|---|---|
| Dimensions | 3 levels (Individual focus, Group Focus, and Cross-boundary focus), 6 dimensions and 9 norms | Emotional Awareness (self and others) and Emotional management (self and others) |
| Measurement | Group EI norms survey | Workgroup Emotional Intelligence Profile (WEIP-S) |
| Reliability | 0.82 | 0.82 |
| Instrument Design | The initial survey was identified 13 norms. Now 9 norms | Different version: WEIP-S (short version) 16 questions |
| Self-report | Yes | Yes |
| Instrument available | Non-public | Non-public |

develop as group members interact with each other. Group EI survey not only can be used in Group EI study, but also used in team‘s building and development. The results of the survey can be used to help team members focus their behaviour as they go about their work.

WEIP-S [20] is designed by Jordan and Lawrence based on Mayer and Salovey's EI model. It mainly focuses on emotional awareness (own and others) and emotional management (own and others) in teamwork. The core abilities of both of Druskat and Wolff's model and Jordan and Lawrence's model are the individual EI level and the Group EI level. Thus, it is important to distinguish between the emotional abilities in dealing with the self and in dealing with others. Previous research [106] clearly demonstrated the differential effects on our own and others' emotions. The abilities related to our own emotions involve intrapersonal abilities, while the abilities related to others involve interpersonal abilities, such as communication and conflict resolution abilities [28]. A comparison of Group EI norms and WEIP is summarized in the Table 2.7.

## 2.5 Relationship between Group EI and Group Performance

The last section provided a basic understanding of the theories, models and measurements for Group EI. Reviews of previous studies show that EI plays an important role in teamwork. It is also a strong predictor of work performance. Thus, more and more organisations are aware of the importance of employees' EI when working as a group, so that they focus on more aspects on top of employees' academic knowledge and skills. Before discussing the relationships between Group EI and group performance, it is necessary to understand the difference between individual performance and group performance. Thus, this section develops a comprehensive review of individual EI and individual performance, individual EI and group performance and Group EI and group performance. The limitations of existing studies indicate a potential research gap.

### 2.5.1 Individual Behaviour in Groups or Organisations

An organisation normally focuses on the outcomes in three levels: individual level, group level, and organization level [132]. Figure 2.5 summarizes a guiding system model with the important forces and outcomes in order to diagnosis individual and group behaviours in organisation. A broad diagnosis would encompass the whole range of factors shown in the figure. A focused diagnosis would consider the subsets that were found to be important during entry and that closely reflected client concerns. The arrow in Figure 2.5 for human resource inputs refers to characteristics and traits that employees acquired in the past. The two boxes in the center of the bottom row depict the main forms of organisational behaviour that shape group and individual outcomes. The outcomes shown in the figure include organizational, group, and individual effectiveness, along with quality of work life(QWL) and well-being. QWL refers to the degree to which work contributes to employees' material and psychological well-being [133]. For simplicity, the model does not distinguish between divisional and organization-level phenomena, but this distinction may be important if divisions differ substantially from one another.

Individual effectiveness includes the degree and quality of a member's efforts, their level of initiative, cooperation with other employees, absenteeism, lateness, and commitment to the job. QWL and well-being are often defined in terms of employee's levels of satisfaction with the following conditions: job security, fairness and adequacy of pay, working conditions, interpersonal relations, and meaningfulness and challenge of work [132]. Individual performance as the basic level of outcomes in organization, individual behaviour is a range of actions in response to various factors. These factors can be grouped into two main categories: the personal factors and the environmental factors. The personal factors include abilities, gender difference, culture, attribution, perceptions and attitudes. Based on these factors, in general, Levitis et al. [26] suggests the following definition:

> *Behaviour is the internally coordinated responses (actions or inactions) of whole living organisms (individuals or groups) to internal and/or external stimuli, excluding responses more easily understood as developmental changes.*

Abilities are the skills a person learns from the environment as well as is gifted with by birth. These abilities include emotional abilities, mental abilities, and physical abilities [134]. Mental abilities represent the intelligence, individual deductive reasoning, memory, analytical and verbal comprehension. Physical abilities include muscular strength, stamina,and body coordination. People's abilities caused difference in their work - the skills to perform various tasks. Thus, how the emotional abilities influence individual performance, and subsequently influence group performance will be reviewed in the following sections.

### 2.5.2 The Definition of Group Performance

Ancona and Caldwell [135] assert that cooperation and collaboration, which are fundamental processes in group work, can significantly improve group performance. Meanwhile, Druskat and Wolff [9] have also shown that cooperation and collaboration in a group can be predicted and facilitated by the group's dynamics and interpersonal relationships. They agree that both building collective beliefs and

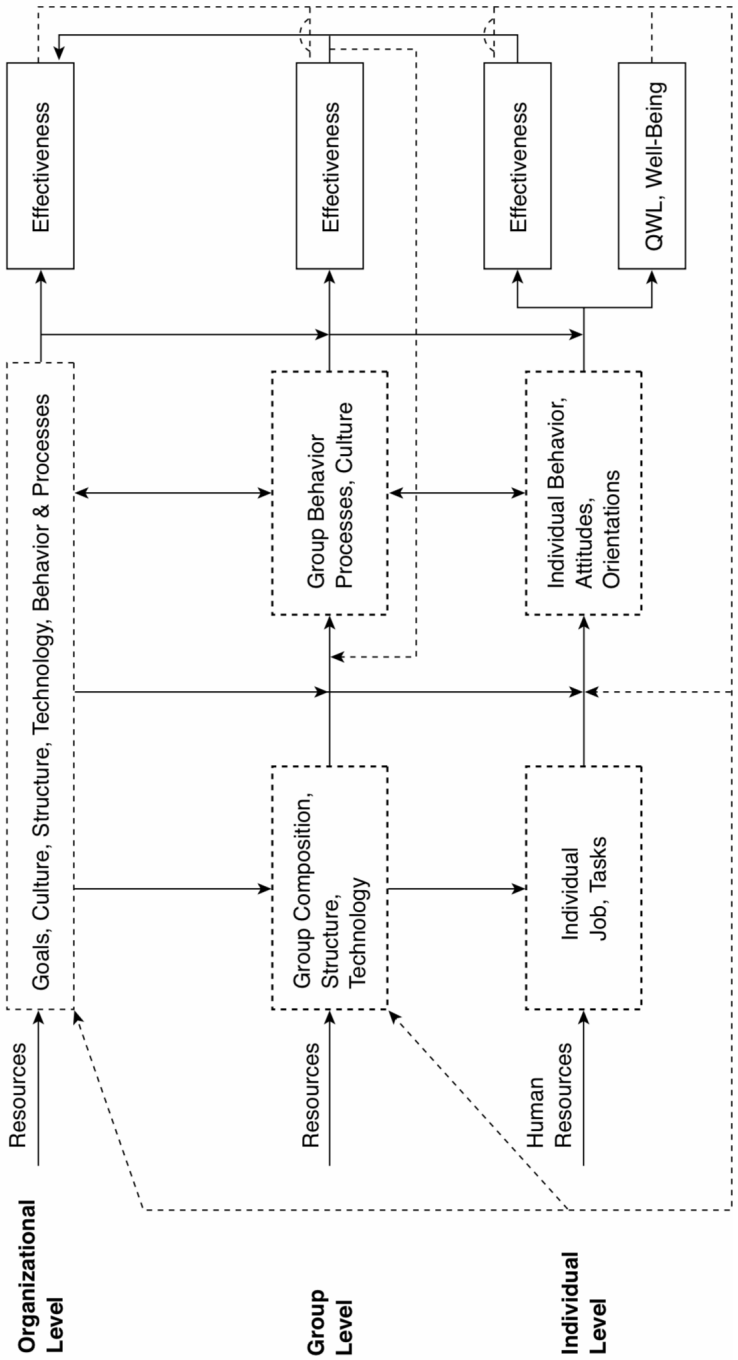



Figure 2.5: Model for Diagnosing Individual and Group Behaviour [132] (solid lines show main lines of influence, and broken lines show feedback loops.)

an effective interaction process (cooperation and collaboration) rely on Group EI. From their research, three conditions are necessary for group performance: trust, group identity and group efficacy.

- **Trust**: Trust among members.

- **Group identity**: A feeling among members that they belong to a unique and worthwhile group. Boyatzis [136] found that successful managers were keen to build group identity in their groups to increase cooperation between members and commitment to the group. Therefore, a group can clearly understand their goals and the members are positively motivated for cooperation and collaboration.

- **Group efficacy**: The belief that the group can perform well and group members can work together effectively. Relevant research also agrees that a group's sense of efficacy is linked to its task effectiveness [137].

High-performance teams (HPTs) is a concept within organisation development referring to teams, organisations, or virtual groups that are highly focused on their goals and that achieve superior business results [138]. A high-performance team is defined by Bard [139] as

> *a group of people with specific roles and complementary talents and skills, aligned with and committed to a common purpose, who consistently show high levels of collaboration and innovation, that produce superior results.*

The expected outcomes from a certain team or an organisation are different based on the tasks assigned to that team or organisation. How to measure or evaluate group performance is an unresolved issue for the studies concentrating on the relationship between EI and group performance.

### 2.5.3 How to Measure Group Performance

Performance measurement is a tool to help people understand, manage, and improve organisations for the purpose of achieving expected outcomes. In a handbook of how to measure performance (prepared by Prepared by the Training Resources and Data Exchange (TRADE) and Performance-Based Management Special Interest Group) [140], most performance measures can be grouped into the following six categories. According to these categories, organisations can develop their own appropriate categories dependent on the missions of the organisation.

- **Effectiveness**: A process characteristic indicating the degree to which the process output (work product) conforms to requirements [140]. (Are we doing the right things?)

- **Efficiency**: A process characteristic indicating the degree to which the process produces the required output at minimum resource cost [140]. (Are we doing things right?)

- **Quality**: The degree to which a product or service meets customer requirements and expectations [140].

- **Timeliness**: Measures whether a unit of work was done correctly and on time. Criteria must be established to define what constitutes timeliness for a given unit of work. The criterion is usually based on customer requirements [140].

- **Productivity**: The value added by the process divided by the value of the labour and capital consumed [140].

- **Safety**: Measures the overall health of the organisation and the working environment of its employees [140].

Jacobs [58] also indicates that organisations have most commonly used a 360-degree process to assess group behaviours, performance, or competencies.

### 2.5.4 Individual EI and Group Performance

A number of empirical studies have explored how EI plays an important role in teamwork [141] [3]. An increasing number of organisations are taking EI tests for their employees in order to improve performance [77, 3]. Slaski and Cartwright [19] looking at 224 managers in the retail industry demonstrate a positive relationship between trait EI and quality of work life and work performance. Meanwhile, trait EI has a strong negative relationship with workplace stress. A number of studies [141] [19] demonstrate that trait EI could enhance performance in interviewing and management, but only a small amount of research has examined ability-based EI and performance. According to Mayer et al. [142], individuals who scored higher on the Emotional Perception scale will be able to understand how their families and colleagues are feeling and will also be good at interpersonal interactions. Mayer claimed that high EI employees may have smoother interactions with members of their team, and may be better able to understand how their team members are feeling and give appropriate responses.

Katz [143] mentions that organisational success is not only dependent on employees' job performance, but also on behaviours to help their co-workers and organisations. These behaviours are defined by Organ [144] as organisational citizenship behaviours (OCB) with three dimensions, *Sportsmanship* (not complaining about the organisation), *Helping Behaviour* (helping co-workers and providing encouragement) and *Civic Virtue* (becoming involved in, and showing concern for the organisation) [145].

Subsequently, Day and Carroll [18] examined Mayer's [142] claim using an ability-based measure (MSCEIT) of EI to predict individual performance, group performance, and organisational citizenship behaviours (OCB) for 246 participants (47 work groups). An 11-item measure of OCB adapted from Podsakoff, Ahearne, and MacKenzie [146] was used to assess group members' citizenship behaviour. And this citizenship behaviour measurement was rated at the individual level and at the group level. They hypothesised that high EI individuals could be expected to

engage in citizenship behaviours in a group situation [18]. The participants performed a decision-making task, and the results reveal that only the emotional perception scale of the MSCEIT has a correlation with individual task performance, and the four MSCEIT scales have no correlation with overall group performance. This means only the emotional perception of the MSCEIT could predict individual task performance. For citizenship behaviours, the MSCEIT sub-scales have no significant correlations with the individuals' citizenship behaviours. The potential problem of this study may be the work period is short, so the participants cannot accurately assess the group citizenship behaviours. Another possible reason is trait-based EI measurements may be more related to OCB than MSCEIT, as Borman and Motowildo mention that cognitive ability may predict job performance and personality may predict OCB [147].

Lyons and Schneider investigated the influence of EI on performance under stress. Participants were required to complete the MSCEIT of individual EI measures, perform some mental arithmetic and give a speech. The results indicate that males' emotional understanding was not related to stress or appraisals, although it tended to be related to accurate mathematical responses, and more effective and better speech content. Emotional management was significantly related to more challenge in mathematics tasks for males. For females, emotional understanding was also related to making fewer mistakes in mathematical tasks. Moreover, Emotional perception and facilitating cognition could not predict stress appraisals. The results demonstrate that emotional understanding and emotional management may be more helpful for in work under stress situations. It also reflects the different influence of EI on performance between males and females, while, the task design and experimental design may prevent the inference of causality.

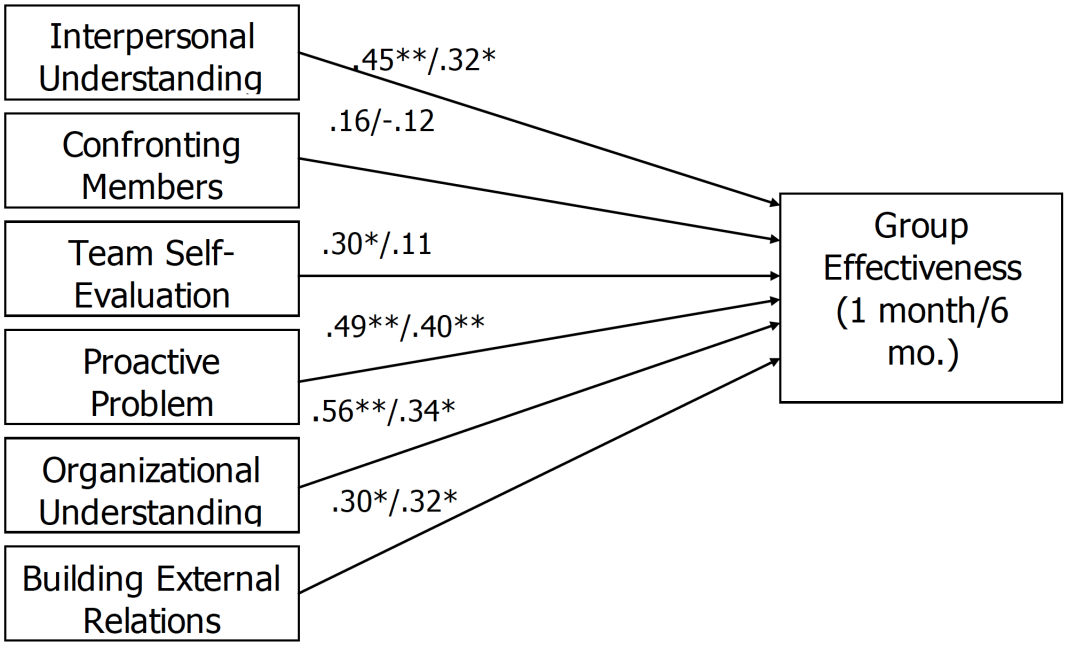
From the above studies, both in Day's study [18] and Lyons' study [2], the teams only worked together for a short period of time. This may result in a lack of expected findings. The advantage of Day [18] is the use of OCB as a secondary evidence of the influence of EI on performance. Both Day and Lyons achieved the Group EI score by computing an average score for each of the four MSCEIT

sub-scales using individual EI scores. The data are not entirely accurate because the Group EI cannot only be dependent on the average of individuals' EI in this group. As mentioned in Section 2.3, Group EI also involves interaction with group members' EI and interaction with external groups. With the development of Group EI measures, a certain number of recent studies use Group EI norms or WEIP to research Group EI and its relation to work team performance.

### 2.5.5 Group EI and Group Performance

Druskat and Wolff [25] use the Group EI survey to demonstrate that Group EI is related to group performance for 48 full-time MBA student teams. Group performance was measured via questionnaire twice. The first time participants were tested after one month; the second time they were tested after six months.

Figure 2.6: Relation of Group EI norms to group effectiveness in MBA students [25]




The findings in Figure 2.6 shows that all Group EI norms have a significant correlation with group effectiveness except Confronting Members Who Break Norms at Time 1. At Time 2, all Group EI norms have a significant correlation with group effectiveness exclusive of Confronting Members Who Break Norms and Team Self-Evaluation. Team Self-Evaluation is significantly correlated with performance at

Time 1, but this was no longer correlated at Time 2. Druskat and Wolff explain that each team was required to complete a formal peer feedback exercise after the Time 1 performance measurement and all teams needed to implement team self-evaluation before Time 2. The meaning of these results are that all Group EI norms influence group effectiveness, excluding Confronting Members Who Break Norms.

At the same time, Jordan and Ashkanasy [20] investigate the relationship between Group EI and group performance for 44 Australian undergraduate student teams over a 3-month period. They measured Group EI using WEIP and group performance using scores of the process effectiveness and goal focus. The results reveal that the significant correlation between Group EI and goal focus is around 0.34 ($p<.05$), but not for process effectiveness ($r(44)=.21$, ns). This means Group EI has a positive influence on the group goal focus, but not on group process effectiveness. Another study by Jordan and Ashkanasy [17] indicates a significant relation between Group EI and group effectiveness, especially self-awareness as a core predictor of group effectiveness.

Luca and Tarricone [148] research Group EI and successful teamwork through a case study of 82 university students. The five emotional and social competencies of Goleman's mixed EI model [16] was used to assess Group EI, and peer to peer feedback was used to measure group performance. The results of the survey analysis and interviews reveal that functional teams have high skills of self-awareness, self-regulation, motivation, empathy and social skills. In Table 2.8, the details of the results' analysis are evident with a clear difference between the two teams, which shows that Group EI has a major impact on the quality of the final product and function of the team.

Goleman [24] in a post hoc analysis across a broad range of industries found that 67% of the competencies determining differential team performance can be summarised as Group EI characteristics.

Table 2.8: Data Summary of Relationship Between Group EI and Teamwork(Quote from [148])

| | **Functional EI Characterises** | **Dysfunctional EI Characterises** |
|---|---|---|
| **Self-awareness** | • Team was aware of their own emotions and the possible impact they could have on the team<br>• Team members tried to sort out problems as soon as possible by trying to be aware of others problems. | • Team members seemed unaware of the impact their behaviour has other team members.<br>• When problems occurred team members tended to take it personally.<br>• Team members didn't predict that comments would upset others. |
| **Self-regulation** | • Team was product focused, and regulated their emotions so that they did not have a negative impact on the product.<br>• The team facilitated the smooth progress of the project, and promoted positive working relationship with team members to get the job done. | • Team members did not realise they had upset peers, and didn't seem to understand the effect the emotional outburst had on the rest of the team.<br>• Team members didn't control their emotions well under pressure and reacted quickly to trivial situations.<br>• In communicating problems, team members were overly emotional and personal. |
| **Motivation** | • Team members felt comfortable and supported in discussing their problems.<br>• Team created a positive and motivating team environment. They tried to motivate team members with constructive criticism.<br>• Team was very goal oriented and focused on the "big picture". | • The team did not create an empowering environment, to allow all members freedom of expression and encouragement to contribute.<br>• Team members lost motivation, especially when their work criticised in a negative fashion. |
| **Empathy** | • Team members had previously worked with others and knew when others were getting upset, which helped to deter conflict.<br>• Team members felt supported in discussing their problems.<br>• Team members respected different personalities, cultures, and sensitivities. | • Could see that a team member was angry and upset, but did not make any effort to try and understand why the team member was angry.<br>• Some team members were aware of each others' feelings, particularly when some were getting upset.<br>• Team members considered others inadequacies as "downfalls" rather than something they could help them with.<br>• The team did not consider everybody's needs during planning sessions.<br>• Some team members felt alienated and did not fell part of them. |
| **Social Skills** | • The team never took issues in a personal manner, as it would detract from developing a quality final project.<br>• The team felt that taking about or communicating problems to each other was a "healthy thing".<br>• The team felt that developing a healthy working environment with good relationships was important.<br>• They often socialised together. | • Lack of communication was evident in the team.<br>• For example, some team members believed that were making allowances for different learning styles, but this wasn't perceived that way.<br>• The team did not communicate their feelings, which resulted in resentment and bad feelings to others. |

## 2.6 Review of Previous Research

From the results presented above, it can be summarised that EI has a positive impact on teamwork and group performance. Most studies demonstrate that teams with a higher level of Group EI will have a high group performance.

The reviews of previous research methods are summarised in Table 2.9. From the table, there are limitations in the methodology in some of the existing research. Firstly, although most previous studies used a large amount of data samples to support their finding, they used a mono-method to collect and analyse the data, such as Slaski [19], Mayer [142], Day [18] and Lyons [2] all use quantitative methodology. At the same time, in their studies, individual EI measurements (i.e MSCEIT) were used to test Group EI in all studies. The average of individual EI scores was used as an indicator for the whole Group EI, and task results were used to represent individual performance or group performance. This results in two potential problems, firstly, can the individual EI measurement be used to stand for the Group EI measurement? and secondly, can the average individual EI be used to represent the overall Group EI? Therefore, how to representatively measure overall Group EI is one of the important issues in Group EI research studies.

Comparing the above studies, Group EI measurements (Group EI norms and WEIP) were used to substitute for individual EI measurements to measure Group EI in Section 2.5.5. However, the average of Group EI scores was still used to represent the overall Group EI of the team. The common study design uses a questionnaire or group scores to measure group performance. Druskat [25] and Jordan [20] use quantitative methodology. While, Luca [148] and Goleman [24] analyse the characteristics of relationships between Group EI and group outcomes of the functional teams using a case study method. A case study is a qualitative study method, and Yin [149] argues that a fatal flaw in doing a case study is that it cannot be used for statistical generalisation, as the method of generalising the results of the case study.

Table 2.9: A Summary of Previous Research Method

| **Authors** | **Research Methodology** | **Data Collection Method** | **Sample** | **Research Aims** |
|---|---|---|---|---|
| Slaski& Cartwright | Quantitative | Questionnaire | 224 managers in organizations | Relationships between managers' EI, quality of working life and management performance. |
| Mayer, Salovey & Caruso | Quantitative | Questionnaire (MSCEIT & taks marks) | 176 employed undergraduates | EI positively contributes to some aspects of job performance. |
| Day & Carroll | Quantitative | Questionnaire (MSCEIT, OCB measure & task marks) | 246 undergraduates | Relationships between EI, individual performance, group performance, OCB. |
| Lyons & Schneider | Quantitative | Questionnaire (MSCEIT & taks marks) | 126 undergraduates | The influence of EI on performance under stress. |
| Druskat & Wolff | Quantitative | Questionnaire | 48 full-time MBA students | Relationship between Group EI and performance. |
| Jordan & Ashkanasy | Quantitative | Questionnaire | 44 undergraduates | Group EI and group performance. |
| Luca & Tarricone | Qualitative (case study) | Questionnaire & Interviews | 82 university students | Group EI and group performance. |
| Goleman | Qualitative | Post hoc analysis | a board range of industries | Group EI and group performance. |

## 2.7 Summary

This chapter provides a comprehensive understanding of the background, theories, models and measures of individual EI by reviewing the EI literature. Two predominant EI models (Ability EI model and Mixed EI model) are discussed in relation to the context and measurable dimensions. The four most commonly used EI instruments are also discussed in relation to its context and method of measuring. Various relationships between EI and gender, age, and experience; EI and personality; and, EI and Alexithymia are also discussed in relation to the context in Section 2.2. This provides a foundation for reviewing Group EI and the influence of Group EI in Sections 2.3 and 2.5.

This chapter has an in-depth review of the background, theories and measures of Group EI in Section 2.3. Group EI norms and WEIP were also elaborated on in relation to two main Group EI measures in Group EI studies. This provides a basic understanding for discussing what is the suitable Group EI instrument to use in this research (see Chapter 4).

As individual EI is an a powerful predictor of a person's ability to achieve a successful job. Group EI is also an important factor in teamwork and a strong predictor of group performance. The reviews of the relationship between Group EI and group performance studies demonstrates that Group EI has a positive impact on teamwork. However, through reviewing existing research, it is clear that existing Group EI measurement approach is less representative as none of existing works consider many other factors when people work as a group. Therefore, an more representative Group EI measurement approach is needed. In response to the research gap, an exploratory study needs to investigate how Group EI influences group performance. Hence, these combine together to generate the aim of the current research which is to *explore a more representative method to measure overall Group EI, and the influence of Group EI on group performance*. In fulfilling the research aim, two research questions and hypotheses are established, and four objectives are addressed and explained with the related context in Chapter 3.

The next chapter states the research aims, research questions and related hypothesises, discussing the objectives according to each research question.

# Chapter 3

# RESEARCH QUESTIONS AND HYPOTHESES

## 3.1 Introduction

Chapter 2 presented the literature reviews about the definitions of EI, Group EI and group performance. The context for the current study on the relationship between group EI and group performance revealed a gap in the research. Most authors of the relationship between EI and leadership in Section 2.2.4 suggests a future work about the relationship between team leader EI, group EI, and group effectiveness [88, 7, 94, 96]. Meanwhile, the previous studies on the influence of Group EI on group performance in Section 2.6 implies that how to more representatively measure the whole Group EI could be another research gap. Therefore, this chapter presents the research questions developed from the research gap and the hypothesises adopted to meet the aim and objectives.

## 3.2 The Justification for Current Study

The findings from the Literature Review (Chapter 2) made a claim about the contribution of EI to success and performance. However, most teams in the reviewed studies were either measured in relation to their individual EI and the group's goal

focus and process in completing assigned tasks, or the average of group EI scores was used as an indicator of overall group EI. One common overlooked problem in these studies is that none of the studies explains why used the average value of group EI measurement scores. In fact, employees' positions and tasks are different within a team or an organisation. Using the average value means the individual EI of each group member has the same proportion of the whole group's EI. This implies every group member's EI plays the same role in group EI. Even if they have different team roles and tasks, their individual EI makes the same contribution to group EI. This method is the opposite of the findings in the studies of EI and leadership in Chapter 2, which claim that the team leader's EI affects group members' emotions and substantially affects work attitudes and performance. In particular, Jordan [20] argues that one limitation of his study is the effects of the internal structure of the groups, such as the EI of the leader, were not analysed. Meanwhile, Ashkanasy [21] suggests that Group EI maybe more than the aggregate of group members' individual EI. This means the simple average of individual EI scores cannot be used to representatively describe and represent the overall EI of a group.

The study design of the influence of group EI on group performance is the group's goal focus and process in completing assigned tasks. In the quantitative research method studies [150, 17, 20, 2], students are the main participants and task results are used to evaluate group performance. For example, speech task results are used in Lyons [2] and assessment results in Jordan [20]. However, this only satisfies one or two factors out of six categories of group performance measures reviewed in Section 2.5.3 of Chapter 2. In the qualitative research method studies [148, 24], the participants are an organisation or a company and the number of samples is small. The characteristics of high EI groups with high group performance were analysed in detail. However, few studies investigate the group performance through more comprehensive measuring methods.

The aim of this research is to *explore a more representative method to measure overall group EI, and the influence of group EI on group performance.* The re-

search aim can be decomposed into two research questions and two hypothesises, detailed below.

## 3.3 Research Aims and Objectives

The aim of this research is to *explore a more representative method to measure overall group EI, and the influence of group EI on group performance.* The research aim can be broken down into six objectives:

1. To propose a new Group EI measurement approach whose calculation considers the role and responsibility of each member in the group.

2. To explore a way to assess and quantify the weight coefficient of each role in a group to support the proposed Group EI measurement approach.

3. To demonstrate that the proposed Group EI measurement approach is more representative than the existing approach which uses the average value of each group member's individual EI as the Group EI.

4. To demonstrate that the proposed Group EI measurement approach is positively correlated to existing performance measurement categories.

5. To demonstrate that the proposed Group EI measurement approach can also be positively correlated with other group performance measurement categories which have not yet to be evaluated in the existing research.

6. To propose recommendations to enhance Group EI.

In summary of the research aims and objectives, two research questions are proposed. Each research question is elaborated on below and explained in relation to the literature.

## 3.4 Research Questions and Hypotheses

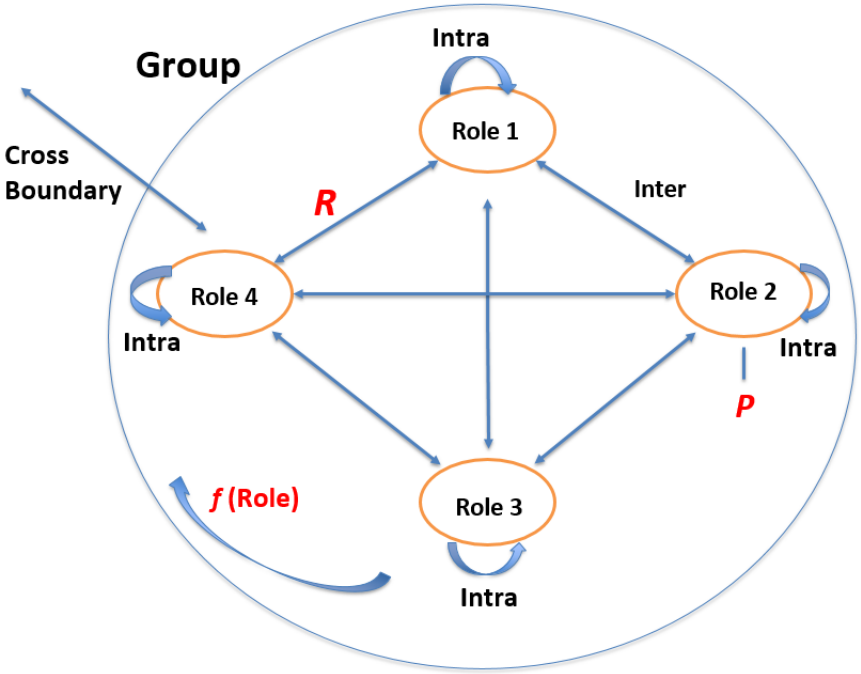
### 3.4.1 Research Question 1

According to the research aims, a more representative method to represent group EI is the first issue which needs to be resolved. Thus, the first research question is:

**Research Question 1: How can overall Group EI be more representatively measured compared to existing approaches?**

Group EI involves intrapersonal EI, interpersonal EI and emotions between different groups. From reviewing the literature on EI and leadership, and the effect of EI on teamwork in Chapter 2, there are many empirical studies which explore the impact of leaders on group EI. The exploratory evidence shows the impact of the EI of leaders and followers on job performance [88]. Thus, this research discusses how EI is applied by different positions when working as a team, with details summarised in Figure 3.1.

Figure 3.1: Interactions of EI in Group Work with Team Roles



***P*** is individual intrapersonal EI, ***R*** is interpersonal EI for the interaction between different members, ***f*** is a function to measure overall group EI according to the different roles in the group. Most previous studies represented the overall group EI (*GEI*) using the average of individual EI scores in Formula expressed as below.

$$GEI = \frac{1}{N}\sum_{i=1}^{N} G(i) \tag{3.1}$$

where:

GEI: Measured Group EI

N: The number of group members

G(i): The measured individual EI of the $i^{th}$ group member

However, Stubbs [94] demonstrates that the group leader's EI has a direct influence on group performance. At the same time, Goleman [16] claims that the group leader's EI makes up to 67$\%$ contribution to group performance. On the basis of the findings from Stubbs [94] and Goleman [16], the proportion of different roles within a team or different job positions within an organisation is distinct. It is possible to provide an understanding of the contributions of different roles to the overall GEI. Consequently, this research proposes that the contribution proportions of different members could have an impact on the overall EI of a group. The overall GEI should be formulated as:

$$GEI = \sum_{i=1}^{N}(G(i) \times W(i)) \tag{3.2}$$

where:

GEI: Measured Group EI

N: The number of group members

G(i): The measured individual EI of the $i^{th}$ group member

W(i): The weight coefficient of the $i^{th}$ group member

Objective 1-3 aim at giving an evidence to research question 1. From an in-depth discussion of research question 1, the first hypothesis is proposed as:

**H1: The weighted average of individual EI scores as an indicator of the overall EI of a group based on different roles' contributions to team-based work is more representative than the average of individual EIs.**

### 3.4.2 Research Question 2

A considerable number of studies have explored the influence of individual EI and group EI on group performance [18, 2, 150, 25, 20, 17, 148, 16]. No matter what methodology they use, the results demonstrate that EI is a strong predictor of group performance, and EI is becoming more and more important in teamwork. More and more managers start to consider to apply the influence of EI in project management, As well as the limitations of measuring group EI, which is discussed in research question 1, another limitation of previous studies is that no study had comprehensive measures of the group performance. According to reviews of six categories of group performance measures in Chapter 2, most studies employed only one or two categories. Thus, it is possible to investigate how to quantify all six categories of group performance in team-based work. After examining **H1** and measuring six categories of group performance, it is also necessary to examine whether the group with high EI level is more likely to have high group performance. The next research question is formed as follows:

**Research Question 2: What is the influence of group EI on group performance**?

Objective 4 and 5 aim at giving an evidence to research question 2. Accordingly, the second hypothesis of the research is that:

**H2: Group emotional intelligence is positively correlated with group performance.**

## 3.5 Chapter Summary

This chapter explains the aims and the reasons for the research in the light of the Literature Review. According to the justifications for the research, the research aim was decomposed into two research questions, and subsequently two hypothesises were developed. In fulfilling the research questions, six research objectives are outlined. In order to investigate the proposed research questions, the next chapter presents the research design and the methodology of the research in detail, discusses the research philosophy and states the methods of data collection and analysis.

# Chapter 4

# RESEARCH METHODOLOGY

## 4.1 Introduction

In order to investigate the research questions raised in the previous chapter, it is necessary to discuss an appropriate methodology so that the research questions can be addressed. Therefore, this chapter examines the research methodology. Research methodology is an encapsulation of the methods under which the research questions were investigated, the sequence in which the chosen methods were organised, and the justification for why such methods and sequence were chosen to investigate the research questions. The research methodology is based on the nature of the research, and the philosophy the researcher believes in. Thus, this chapter will start by introducing the research philosophy in Section 4.2, which includes introducing the ontology of this research in Section 4.2.1, introducing the research strategy in Section 4.2.4, and the research method in Section 4.2.2.

Based on the research philosophy, the design of this research is examined in Section 4.3. The details of the required resources for this research will then be discussed individually in the next sections, including the data source selection in Section 4.4, the tasks done by the participants during the research in Section 4.5, and the materials used in this research in Section 4.6. The research validity and reliability, and ethical considerations related to the methodology will be discussed in

Section 4.8 and Section 4.9 respectively. Finally, this chapter is summarised in Section 4.10.

## 4.2 Research Philosophy

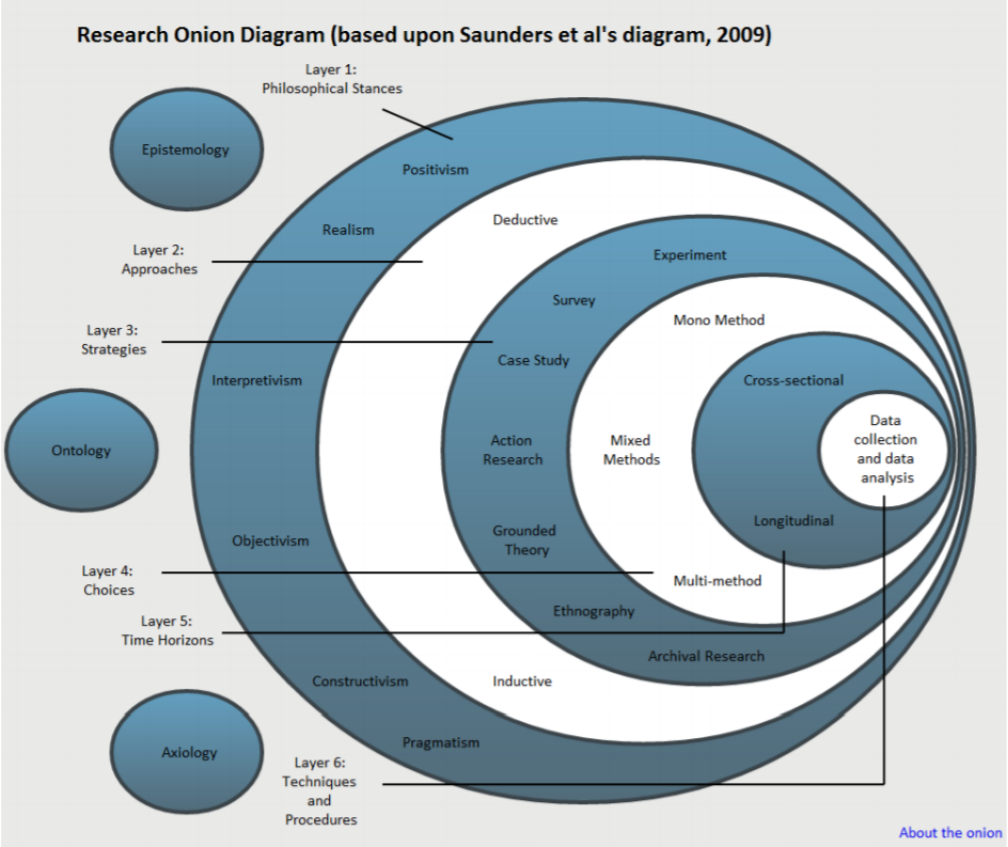
It is widely accepted that the research paradigm is the overall conceptual framework within which researchers investigate the world [151]. According to Kuhn [152], the research paradigm is "*the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed*". The research paradigm can be characterised as ontology, epistemology, and methodology. Crotty [153] states that there are four customary areas required to be considered before conducting the research in every research project: ontology, epistemology, methodology and method. Ontology and epistemology are part of a research philosophy which refers to the set of beliefs concerning the nature of the reality being investigated [154]. Understanding and choosing a philosophy is an important step before planning and carrying out a research project and formulating an effective methodology [155]. Ontology is concerned with the nature of reality, while epistemology is concerned with the question of what is acceptable knowledge about the field of research. Methodology refers to a system of methods used in a particular area of study [156]. The Method is the solution to a research problem, the techniques to collect and analysis data.

The research onion was developed by Saunders [157] and is demonstrated in Figure 4.1. It illustrates the stages that must be covered when developing a research strategy. According to this research, this chapter illuminates the research onion from outside to inside. The following sections discuss the different philosophical approaches in detail.

### 4.2.1 Ontological Consideration

The central question of ontology is "what is the nature of reality?" [158], which applied to this research is "what is the nature of emotional intelligence?", and "what is the nature of group emotional intelligence?". As alluded to in Chapter Two, the

Figure 4.1: Research Onion Diagram [157]




term EI has been investigated by different researchers and has different meanings. Different perspectives have resulted in different approaches towards EI measurements and subsequently different research findings [53]. EI is a multi-dimensional construct relating to emotion and cognition, with the aim of improving human interactions [10], and in particular improving team behaviour [113] and team performance [106]. While Group EI represents the ability of a group to understand and deal with emotions, it is the whole group's feelings and the behaviours of the individual EI within it. Different Group EI models developed from different EI models. It is customary for every research project to consider individual EI as the core of Group EI. Thus, it is very important to clarify which meaning and model of Group EI are used in the current research.

The current research assumes the stance that Group EI is an existing construction which encompasses individual EI, a series of emotional and social skills that results in emotional processes during group work. Subsequently, the emotional

processes influence group performance. At the same time, emotional and social skills are intertwined when managing emotions in interpersonal situations [159]. The Group EI model proposed by Jordan and Lawrence [20] defines the Group EI model as: awareness of own emotions, management of own emotions, awareness of others' emotions, and management of others' emotions. Furthermore, this Group EI model has been established in various studies in relation to the relationship between Group EI and teamwork such as conflict resolution [106] and group performance [20, 3, 17, 128]. Therefore, the current research uses Jordan's Group EI model as an instrument to identify Group EI, which is demonstrated in quantitative data analysis and qualitative data analysis of the group work.

### 4.2.2 Research Method

From the reviews in Chapter 2, most existing research adopts either a qualitative research method or a quantitative research method, although there were some debates about whether research should be conducted through using only one method, and whether it would be better to combine different research methods. This research method is known as a mono-method. Mingers [27] argues that no one research method can solely and comprehensively capture the real world situation, as real world problem situations are extremely complex and multidimensional. Different methods focus on different aspects of the situation. For example, research adopting a qualitative research method may have a detailed view of one scenario. It allows the researchers to find the issues that are often missed. However, as the findings are not obtained from large-scale data sets, it can be concluded that such findings cannot be generalised. On the other hand, quantitative research methods are considered to be scientifically objective and rational as they can be interpreted with statistics [160]. However, small scale quantitative studies may be less reliable due to the low quantity of the data [161], and the participants having no opportunity to explain the reasons for their answers [162]. Thus, if mono-method research is adopted, it will have significant limitations in terms of the perspective of the research situation.

In contrast to mono-method research, if a study adopts more than one research

method to obtain the findings, such methods are known as mixed-methods. Yin [149] asserts that mixed-method research can permit researchers to address more complicated research questions and collect a richer and stronger array of evidence than can be accomplished by any single method alone. It is considered to be more effective and comprehensive for researchers to deal with real world situations. For example, one phenomenon may be observed from a set of data when adopting a qualitative research method. Then, by adopting a quantitative research method, it is possible to scientifically demonstrate that the phenomenon is not an isolated case. It objectively exists and applies to most situations.

### 4.2.3 Advantages of qualitative research

Qualitative research plays an important role in the exploratory phases of a research topic particularly when the phenomenon or subject to be investigated is complex and little is known about it. Conger [86] explains *"As our understanding becomes increasingly well-defined, quantitative analysis can then refine and validate with 'empirical rigor' the hypotheses generated by prior qualitative investigations"* (p.108). One of the unique properties of qualitative research is that it can be used to study selected issues, cases or events in depth and in detail. Such research can be used to focus on smaller samples as opposed to quantitative studies which emphasise on larger representative samples which aims at generalising the findings. This is indeed an advantage of quantitative research: generalising set of findings as it involves measuring or testing hypothesis and variables by comparing and statistically aggregating a large set of data. However, this form of research is only limited to a set of structured questions whereas in qualitative research, one has the freedom and flexibility to explore and produce a wealth of detailed data and description about a smaller number of cases, incidents, events, interactions, observed behaviour or people. Burnard et al [163] show how data analysis in quantitative research often occurs after all or much of data have been collected whereas in qualitative research, this begins during, or immediately after the first data have been collected. They also point out that such a process of analysis involved in qualitative research continues and can be modified throughout the study. Borrego et al

[164] suggest the concept of generalisability in quantitative research is replaced by the term transferability in qualitative research. They further clarify that *"Qualitative research seeks to generalize through thick description of a specific context, and allowing the reader to make connections between the study and his or her own situation"* (p.57). A major source of qualitative data can be obtained using interviews or case study analysis, and a lot of it depends on the skill, competence and rigorousness of the researcher.

The research presented in this thesis aims at exploring a more representative method to measure Group EI, and exploring the influence of Group EI on group performance as identified in Chapter 3. The data samples in this research are in the unit of a group. As each group consists of many different people, the situations become more complex. Therefore, using mono-method research may not clearly explain how Group EI affects group performance in some particular situations (e.g a group has high Group EI but have low group performance). As a result, it is believed that by using a multi-method research method, it will provide a more comprehensive understanding of the research questions, as the empirical findings can be better explained.

### 4.2.4 Research Strategy

As reviewed in Chapter 2, people with different EI can have many different characteristics. These characteristics are the subjective descriptions of the abilities to understand one's own emotions and others' emotions, and the abilities to manage one's own emotions and others' emotions [165, 166]. One book *"An Introduction to Emotional Intelligence"* written by Dacre Pool and Qualter [32] mentions that *"EI is one of those concepts we find it easier to recognize than to define"*. Therefore, it can be considered that EI is an objective measurement of many subjective characteristics. As a consequence, in order to explore whether one EI measurement approach is more representative than another, it is necessary to know the characteristics of the things which are being measured. As research into EI and related domains requires both objective and subjective data, two research strategies, a case study and a survey, will be adopted in this research.

### Case Study

In order to answer Research Question 1, it is necessary to collect the evidence which can demonstrate the EI characteristics of each group, and can analyse the ability of emotional awareness and understanding of each group so that whether one EI measurement approach is more representative than the other can be analysed. However, such evidence is not obtainable through the research methods that provide score-based results. For example, the Group EI score of Group 1 is 75 with proposed measurement approach, and 65 with average EI score. The scores only show that one measurement is higher than the other. They do not contain the detail of what lead to the scores. Subsequently, no conclusion can be made to whether one method is more representative than the other.

Through the review of existing researches and as explained in Section 4.2.3, it can be seen that the case study, as a qualitative research method, has the ability to summarise the EI characteristics of a functional/dysfunctional group (e.g the study from Luca's and Tarricone's [148]). It can explain the findings in-depth in terms of why this group has highest group EI, and how the Group EI works between group members during their teamwork in different scenarios. Furthermore, the findings from the case study can also explain what is the influence of Group EI on group performance through correlating the EI characteristics to the outcome of each task, which can also address Research Question 2. Therefore, case study fully meets the purpose of this research. Consequently, the first research strategy is a case study.

A case study was defined by Yin [149] as an empirical inquiry that investigates a contemporary phenomenon in real-life. Dooley [167] states that a case study emphasises the detailed contextual analysis of a limited number of scenarios in which the phenomenon of interest can happen. Yin suggests that a case study is the preferred strategy when "How" or "Why" questions are being posed in the research process, and the investigator has little control over events. It can be conducted using single or multiple case studies depending on the research question(s). Case

Table 4.1: Six Sources of Evidence: Strengths and Weakness (quoted from [149])

| Source of Evidence | Strengths | Weaknesses |
|---|---|---|
| Documentation | • stable - can be reviewed repeatedly<br>• unobtrusive - not created as a result of the case study<br>• exact - contains exact names, references, and details of an event<br>• broad coverage - long span of time, many events, and many settings | • retrievability - can be low<br>• biased selectivity if collection is incomplete<br>• reporting bias - reflects (unknown) bias of author<br>• access - may be deliberately blocked |
| Archival Records | • Same as above for documentation<br>• precise and quantitative | • Same as above for documentation<br>• accessibility due to privacy reasons |
| Interviews | • targeted - focuses directly on case study topic<br>• insightful - provides perceived causal inferences | • bias due to poorly constructed questions<br>• response bias<br>• inaccuracies due to poor recall<br>• reflexivity - interviewee gives what interviewer wants to hear |
| Direct Observations | • reality - covers events in real time<br>• contextual - covers context of event | • time-consuming<br>• selectivity - unless broad coverage<br>• reflexivity - event may proceed differently because it is being observed<br>• cost - hours needed by human observers |
| Participant Observation | • same as above for direct observation<br>• insightful into interpersonal behaviour and motives | • Same as above for direct observations<br>• bias due to investigator's manipulation of events |
| Physical Artifacts | • insightful into cultural features<br>• insightful into technical operations | • selectivity<br>• availability |

studies can employ various observation methods. Dooley [167] states that the strength of a case study is the ability to use multiple sources and methods within the data collection process. Yin [149] summarised those methods as "Six Source of Evidence" which includes Documentation, Archival Records, Interviews, Direct Observations, Participant Observation, and Physical Artifacts. The strengths and weaknesses of these methods are summarised and shown in Table 4.1.

According to Yin [149], a case study can be carried out for three types of purpose: exploratory, descriptive or explanatory. An exploratory purpose case study aims at observing phenomena which are unknown or unclear to the researcher at the time

when the case study is carried out. The second purpose for which the case study is carried out is descriptive. The descriptive purpose case study tries to produce a detailed description of a phenomenon which is of interest to the researcher. The last purpose of a case study is to give a detailed explanation or understanding to the phenomenon of interest.

#### Survey

Using a survey strategy is often associated with a deductive approach. Survey studies are undertaken with a view to making statistical inferences about the population being studied. They are associated with survey data collection techniques and strongly depend on the survey questions used. Survey methodology includes instruments or procedures that ask one or more questions that may, or may not, be answered [168]. It offers the researcher a highly economical way of collecting large amounts of data to address the who, what, where, when and how of any given topic or issue. This strategy can generate rich statistical data [169].

In this research, it is necessary to collect data on individual EI within the groups, and the instruments used for data collection are questionnaires. Statistical results provide stronger evidence in the objective method. Moreover, the relationships between Group EI and group performance can be directly presented in a survey. Thus, the second research strategy is a survey.

## 4.3 Research Design

The purpose of the research design is to ensure that the research questions can be addressed in a logical and structured way. Based on the research objectives, hypotheses and the research philosophy, this section introduces how this research is designed and structured. Overall, this research is broken down into three phases. Before each phase is discussed in detail, it is necessary to clarify what data was collected during the research. According to the research objectives, the following data was collected for analysis:

- **Group emotional characteristics -** Based on the existing literature, there

are many emotional characteristics for groups with both high Group EI and low Group EI. In order to analyse the Group EI of a specific group, it is necessary to have an insight into the group's emotional characteristics, so that it is able to categorise whether that specific group has high Group EI or low Group EI. This evidence can be used to assess which Group EI measurement approach is more representative. Thus, group emotional characteristics will be collected and summarised from case study and will be explained in details in Section 4.3.1.

- **Individual EI of each group member -** The existing Group EI measurement approach and the proposed Group EI measurement approach rely on the measurement of a person's individual EI when that person is a member of a specific group. Therefore, it is essential to measure the individual EI of each group member so that the Group EI can be later measured. WEIP-S will be used to assess the individual EI of each group member (Section 4.6).

- **The weight coefficient of each group member -** In the proposed Group EI measurement approach, the influence of a specific group member to that group is one of the major factors that contributes to the measurement of Group EI. Therefore, it is essential to measure the weight coefficient of each group member to his/her group so that the Group EI can be measured using the proposed approach. 360-degree assessment will be used to assess the weight coefficient of each group member (Section 4.6).

- **Group EI measured using proposed method -** Obtained through the previous two measurements, this is the main evidence used to address the research questions in this research.

- **Group EI measured using existing method -** This is the evidence that is used to do the comparison with the proposed Group EI measurement approach.

- **Group performance -** As this research also looks into the relationship be-

tween Group EI and group performance, the objectively measured group performance will be used as evidence to analyse the relationship. Thus, the data of group performance will be collected from the project results and case study(Section 4.3.1).

Based on the research objectives, hypotheses and philosophy and the data collected, the rest of this section discusses each phase of this research in detail. The discussion will justify how the evidence is collected, and then how the collected evidence is used to address the research questions.

### 4.3.1 Phase 1: Case Study

The first phase of this research uses a direct observation case study strategy to observe participants organised as groups. Each group of participants is treated as a case. The selection of participants and how the participants are grouped will be discussed in detail in Section 4.4. The case study is designed to be longitudinal study which means the research will study each case for a period of time. Meanwhile, the case study will be performed on multiple cases so that it is possible to generalise the findings based on the data from each case. This case study aims at collecting both qualitative data (group emotional characteristics) and quantitative data (group performance) for later analysis.

For each case, the study starts by introducing the researcher to the participants. Then, the researcher will introduce the research to the participants. The introduction is a summarised description of Chapter 3 and Chapter 4 of this thesis. As this is the first phase of this research, and the collected data is useful to this research only if the participants can participate in the whole research, the introduction will also cover information related to the second and third phases of this research, so that the participants will have a better idea of whether they still wish to participate. Following the brief introduction of this research, the data that will be collected and how each case will be recorded for analysis will be introduced to the participants. Once the researcher has finished introducing the relative aspects of this research, the participants will have the chance to ask for clarification of any questions they

may have. Once everything is clear to the participants and they still wish to participate in this research, a consent agreement will be signed by each participant before the study is formally started.

During the case study, the researcher will record every group meeting for that case in the form of video and audio. The researcher will attend the group meeting for each case if there is no time conflict between different cases. However, Patton [170] discusses the naturalistic nature of qualitative research as the researcher does not attempt to manipulate the program or its participants for the purposes of the evaluation unlike an experiment. Hence, the researcher will only be present and listen to the meeting without any interfere with the meeting in any form. During each group meeting, the participants will simply do what they normally do during a meeting. This procedure will be adopted from the beginning (first group meeting of each case) until the end (last group meeting of each case) of this case study. The recorded video and audio of each case will then be analysed by the researcher.

As a direct observation method is used in this case study, such method could cause observing event (the meeting in this case) being proceeded differently because the researcher presents at their meetings. This is the common problem in direct observation method and cannot be avoided, but it can be mitigated [149]. For example, the department of University of York requires each group should has at least one supervision meeting with their supervisor per month. In this meeting, group members will communicate with their supervisors about their current project progresses and the further plans. At the same time, the supervisor will give them some feedbacks and some suggestions for the further work. In addition, each group also irregularly have group meetings to discuss their ideas, works and task assignment. From the beginning to the end of the project, participants totally have 9 months to do the group project in one academic year. This means during one project in one academic year, each group should has at least 9 group meetings. The researcher will try to attend all group meetings of each group during their project. It is possible that the participants acts differently initially, but it is expected that the participants will get used to it. Consequently, although this problem can

not be fully avoided, it can be mitigated.

As the case study in this research is for descriptive purpose, no conclusion will need to be made based on the recorded cases. Instead, the analysis of the recorded cases aims at interpreting the group emotional characteristics based on the recorded video and audio of each case. Such an interpretation will be made for each meeting of all cases. On top of the emotional characteristics, which are considered to be qualitative data, a lot of quantitative data related to the measurement of a group's performance will also be extracted from the case study. More specifically, as reviewed in Section 2.5.3, the following quantitative measurements will be made from the case study:

- **Effectiveness -** The effectiveness is defined in this research as the valid working time (the time a group spend on topic) during each meeting divided by the total duration of that meeting (as defined in Equation 4.1). For example, a group meeting lasts for one hour, of which 40 minutes were spent on the topic of the meeting. The other 20 minutes were spent on topics that were not related to the topic of this meeting (e.g discussing today's headlines). In this case, the 40 minutes is the valid working time and an hour is the total time of meeting. Therefore, 40 minutes out of one hour is the quantitative measurement of the effectiveness.

$$Effectiveness = \frac{Valid\ working\ time}{Total\ time\ of\ meetings} \tag{4.1}$$

- **Quality -** The quality is defined in this research as the overall measurable achievement of the task. As the task for each group, which will be introduced in Section 4.5, is a Masters degree project, the task achievement is measurable through the final mark, which is based on an objective assessment of the detail of each group's work, with regard to the university and degree regulations. Therefore, the final mark of each group's project will be used to measure each group's quality.

- **Efficiency -** The efficiency is defined in this research as the result achieved per unit of valid working time. It can be calculated, as shown in Equation 4.2, by the overall achieved result of that task (in this research, the Masters degree project) divided by the amount of valid working time spent on the task. For example, if a group spent 10 hours to achieve an overall mark of 80, the efficiency of this group will be that this group earn 8 marks for every hour the group spend on the project. For each case, the amount of valid working time that has been spent on the task can be measured from the case records. The results are measured using the final mark for each group's project.

$$Efficiency = \frac{Overall\ achieved\ result}{Valid\ working\ time} \tag{4.2}$$

- **Productivity -** The productivity is defined in this research as the ratio between the overall achieved result and total time of all meetings (as shown in Equation 4.3).

$$Productivity = \frac{Overall\ achieved\ result}{Total\ time\ of\ meetings} \tag{4.3}$$

- **Timeliness -** The timeliness is defined as the ratio of the total number of deadlines that were met divided by the total number of deadlines that were set by the group (as shown in Equation 4.4). For example, one group set 10 deadlines, including the final deadline for their task and sub-tasks. During the process to finish the overall task, that group met 8 deadlines, including the final deadline, and missed two deadlines. In this case, the timeliness was 8 met deadlines divided by 10 total deadlines which is $80\%$.

$$Timeliness = \frac{Number\ of\ deadlines\ that\ has\ been\ met}{Total\ number\ of\ deadlines\ that\ has\ been\ set} \tag{4.4}$$

- **Satisfaction -** The satisfaction is defined as the ratio of the total number of group members divided by the total number of group members that felt

comfortable and the total number of group members that felt pleasure during group work, because there are no safety issues for the participants in this research.

$$Satisfaction = \frac{Number\ of\ members\ that\ felt\ comfortable}{Total\ number\ of\ members\ in\ one\ group} \tag{4.5}$$

### 4.3.2 Phase 2: Questionnaire Survey

The second phase of this research is to measure individual EI as a group member and the weight coefficient of each group member. These two measurements will subsequently lead to the measurements of Group EI using an existing method and the method proposed in this research. This phase aims at quantitatively collecting the aforementioned data for later analysis. Therefore, the method used to perform the measurement is to survey the participants in the form of questionnaires. As there are two measurements to be made and each measurement has different aspects to measure, the procedures and the questionnaires are different for each measurement. As a result, they will be introduced separately.

#### Measurement of individual EI as a group member

In order to measure individual EI as a group member, this research uses the WEIP-S [128] questionnaire to collect data from participants. The detail of the WEIP-S questionnaire and how it is adopted in this research will be introduced in Section 4.6. During the research, individual EI as a group member will be measured twice. The first time the individual EI is measured is at the beginning of the project. The second time the individual EI is measured is when the participants have finished all their tasks. The reason for measuring individual EI twice is that the existing research [25] [36] has indicated that EI as a group member may fluctuate when a group is initially organised. Over time, when individuals stay together as a group, the measured individual EI as a group member may also change. How long it may take for the individual EI as a group member to become stable is outside the topic of this research. Multiple measurements will be taken and the average value of

these measurement will be used, to rule out possible fluctuations caused by the duration of a group being together, so that the research validity can be optimised. Furthermore, by performing two measurements, the research reliability may also be improved [171, 45].

When measuring the individual EI, the researcher will print out the WEIP-S questionnaire for the participants to complete. Before the measurement process starts, the researcher will explain the purpose of the measurement, and the procedure and requirements to the participants, so that the participants can complete the questionnaire more effectively, correctly and objectively. The main requirement for the participants is that they should complete the questionnaire independently, as the WEIP-S is a self-assessment questionnaire.

Once the participants finish the questionnaire, the researcher will collect the finished questionnaires and assure participants that no other person can see the answers in the completed questionnaire except the researcher. After all participants have completed the questionnaire, the researcher will input all the data from the questionnaire into Microsoft Office Excel manually and the individual EI will be calculated for each participant, according to the questionnaire author's instructions. To speed up the calculation, the equation, which is used to calculate the individual EI from the questionnaire, will be pre-edited in Excel. Once all data from the questionnaire is entered, the equation will be applied to the data from each participant and the individual EI index for each participant will be generated for analysis.

**Measurement of the weight coefficient of each group member**

The measurement of the weight coefficient of each group member uses the 360 degree assessment questionnaire [58]. This questionnaire is designed for both self-assessment and cross-assessment. This means that part of the questions in this questionnaire are to assess the participant's own view of his/her influence on the group, and the other questions in this questionnaire are to assess the participant's view of each of the other group member's influence on the group. The detail

of the design of the 360 degree feedback questionnaire for this research and how it is adopted to the research will be covered in Section 4.6.

As this questionnaire aims at measuring the influence on the group of each group member, it is carried out after the participants have completed their tasks as a group. If the measurement is carried out before the completion of the group task, the weight coefficient of each participant towards the group may still change with the group task's progression, which will subsequently affect the measurement accuracy. To assure measurement accuracy, it is also important that each of the participants in each case should finish the questionnaire at the same time, but independently. The researcher will need to supervise the process of completing the questionnaire for each case. The reason for using this procedure is twofold. Firstly, as it is required that the participants within a group evaluate the other group members' influence, each participant's opinion about other group members must be objectively expressed in the questionnaire, so that the measurement is accurate. That means the participants should not discuss their opinions with each other, as that may subsequently change their opinion. Therefore, the researcher's supervision aims at preventing this happen. Secondly, as each participant's opinion on the other participants is expressed in the questionnaire, it may have a negative impact if others know a person's opinion about them. For example, one person expressed his dissatisfaction with the group leader in the questionnaire, due to the unbalanced workload within the group. If such an opinion is seen by others, it may potentially affect the group's future tasks, which is not what this research would like to happen. Therefore, the researcher's supervision also aims at providing confidentiality for each participant's opinion.

Following the aforementioned consideration, the following procedures will be taken when measuring the weight coefficient of each group member. Before the measurement, the researcher will print out the questionnaire for the participants to complete. However, the participants are not notified during this stage. During the measurement, the researcher will introduce the purpose of the measurement, the procedures and the requirements to the participants. Then, the questionnaire

will be distributed to participants for them to complete. As soon as a participant has completed the questionnaire, the researcher will collect the completed questionnaire and put it into an envelope so that the completed questionnaire is not visible from the outside. Also, the researcher will assure them that no other person can see the content in the questionnaire except the researcher herself. After all the participants have completed the questionnaire, the researcher will input all the data from the questionnaires into Microsoft Office Excel manually to calculate the weight coefficient of each group member. To speed up the process, the equation, which is used to convert the data from the questionnaire to the influence index, will be pre-edited in Excel. Once all data from the questionnaire is input into Excel, the equation will be applied to all data, so that the influence index of each participant will be generated for analysis.

Figure 4.2 explains the process of peer to peer evaluation in 360-degree assessment. Equation 4.6 shows the equation used to calculate each member's weight. In 360-degree assessment, each group member is required to evaluate all group members also including themselves. If there are 6 peoples in one group, and $T$ is the total mark of 360-degree assessment for each group member. $M_(i \rightarrow j)$ means the mark of the $i^{th}$ group member evaluates the $j^{th}$ group member, the weight coefficient of the $j^{th}$ group member is

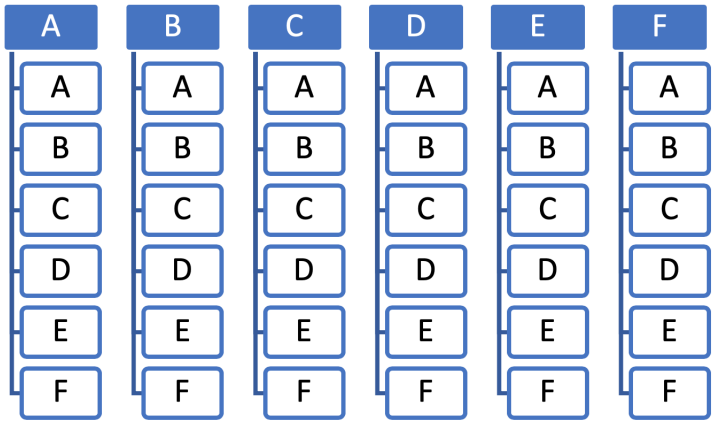
$$W_(j) = \frac{\sum_{i=1}^{6} M_(i \rightarrow j)}{T \times 6} \tag{4.6}$$

### 4.3.3 Phase 3: Mixed-method Data Analysis

The third phase of this research is to analyse the collected data using both qualitative analysis methods and quantitative analysis methods. This analysis aims at providing evidence to support the research hypotheses. Therefore, it is necessary to decide the analysis methods based on the research hypotheses.

In Chapter 3, two research questions and hypothesises are proposed. The first research question and hypothesis looks at the Group EI measurement approach.

Figure 4.2: 360-degree assessment evaluation




The findings in Luca [148] summarise the characteristics of groups with high Group EI and low Group EI (section 2.5.5). GEI Norms (section 2.4.1), designed by Druskat and Wolff in 2001 [9], also demonstrates the critical characteristics of Group EI levels when working as a team. In order to answer research question 1 and verify hypothesis 1, quantitative analysis is used to find the Group EI using the new method proposed in this research and the existing method reviewed in Chapter 2. Subsequently, qualitative analysis of the case study data will demonstrate the characteristics of Group EI in each group. Comparing Group EI scores and the characteristics of each group to answer why the new Group EI measuring method proposed by this study more representatively presents Group EI when working as a team than the existing method. As an example, for group A and group B, if the Group EI scores using the new method are different from the Group EI scores using the existing method, compare the characteristics of the two groups to analyse which group has the higher Group EI. In addition, this research will present which method could more representatively explain different situations in group work through the case study analyses.

In this research, mixed-method data analysis is used to answer research question 2 and verify hypothesis 2. Quantitative analysis could demonstrate the correlation between Group EI and group performance found in statistical evidence. If the correlation is positive, that means groups with high Group EI are more likely to have a high group performance. Qualitative analysis could demonstrate the influence

of Group EI on group performance in-depth. A summary of research design has been presented in Figure 1.1, and research objectives and related methods of data collection/analysis and expected outcomes are summarised in Table 4.2.

## 4.4 Data Source Selection

To carry out the experiments in this research, it is necessary to select a proper source from which the data samples can be collected. According to the discussion of using mixed-method research in Section 4.2.2, there are certain requirements for the sample data selection. In this research, 12 project groups composed of 70 Masters in Engineering Management students (38 females and 32 males) from the Department of Electronics, University of York, were used as the source from which the experiment data was collected. The selection was made based on two main considerations regarding the requirements from the mixed-method philosophy: the amount of data sources and the requirements for the data sources. In the rest of this section, each consideration will be discussed in detail.

**Amount of data sources**

Based on the philosophy of this research and the requirements of this research topic, a mixed-method research method is adopted. That means this research will gather evidence on the research questions using both qualitative and quantitative research methods. As a consequence, it is required that the amount of data sources can fulfil both research methods.

For the qualitative research, we would like to capture all details (e.g every word spoken by everyone during group meetings, with their facial expression during the speech) for later analysis. As the analysis of qualitative data is time consuming, and only the author of this thesis is working on this research, it is not feasible if the amount of data sources is huge (e.g a thousand participants). On the other hand, the purpose of quantitative research is to show whether the results are significant using statistical tools. Therefore, it requires a relatively large amount of data being fed to the statistical tools. Too little data may not carry the statistical significance

Table 4.2: Summary of research objectives and related methods of data collection/ analysis and expected outcomes

| **Research Objectives** | **Method of Data Collection and Analysis** | **Outcomes** |
|---|---|---|
| Examining whether the new approach to assess Group EI is more representative than previous studies. | • 70 MSc Engineering Management students worked in 12 groups (n=12).<br>• Video recording for group meetings of each group.<br>• WEIP-S AND 360-degree assessment.<br>• Case study analysis (Qualitative): based on the Group EI scores, analysing Group EI characteristics of each group. | • Qualitative analysis method: The new method to assess Group EI is more representative than previous method as the new method can explain why this group has highest group EI, and how the Group EI works between group members during their teamwork in different scenarios. |
| Exploring the influence of Group EI on group performance. | • Group project marks (n=12).<br>• Six categories of group performance measurement (n=12).<br>• Quantitative analysis method: analysing the relationship between Group EI and group performance.<br>• Qualitative analysis method (case study): analysing the influence of Group EI on group performance. | • Quantitative analysis method: the positive correlation between Group EI and group performance.<br>• Qualitative analysis method: explaining the reason of one group with high Group EI is more likely to work effectively. |

to support the finding from the research, whereas too large an amount of data will be in conflict to the requirements raised by qualitative research. Therefore, it is believed that between 10 to 20 data sources will fulfil the requirements from both research methods.

**Requirements for data source**

Another consideration for data source selection is the requirements for the data source. In order to fully understand the message carried by the experiment results, it is important to manage any possible confounds. For example, in research aimed at investigating whether a change in element X can lead to a change in element Y, if there is a third element, Z, which can also change element Y, this element is called a confound. In this case, the research design should try to rule out, or minimise the effect from element Z. The techniques used to rule out the confound include randomisation, restriction, matching, and stratification [172]. These techniques will be used to when choosing the data source. On top of this, in this research, the following requirements are considered to be important for the data source:

- **Available to researcher**

  The first and the most important requirement of the data source is the availability of the data source to the researcher. In other words, the researcher has to be able to collect data from the source without too much difficulty (e.g no need to travel from Europe to America). Due to the limited resources (time, funding etc.), it is not feasible to collect data from sources that are not available to the researcher.

- **Normal cognitive ability**

  Cognitive ability mainly refers to things like memory, the ability to learn new information, speech, understanding of written material [134]. As this research does not investigate anything that is related to cognitive ability at all, it is expected to minimise the effect of cognitive ability. Therefore, it is expected all

participants should have normal cognitive ability. By doing this, this research can restrict certain group of people (e.g people with cognitive impairment) from participating.

- **No requirement on the personality**

  As this research does not look into the personality, there is no requirement on the participants' personality. It is expected the participants will have different personality. Then, the participants are randomly organised into different groups. By randomising the personality in each group, it can rule out the possible confound caused by personality.

- **Performing tasks in a group**

  As this research focuses on Group EI and group performance, it is important that the collected data is related to the topic, so that it is useful to the research. Therefore, it is expected that the participants will perform one or more tasks in groups, and the task outcomes are measured at the group level. However, how to organise the groups and the gender composition of each group are not regulated in this research, as they are not within the topic of this research.

- **Tasks at a similar level of difficulty**

  The topic of this research is to explore whether groups with higher Group EI lead to higher group performance. However, group performance can be affected by the level of difficulty of the task which the group is performing. Therefore, it is expected that the tasks for each group are at a similar level of difficulty, so that the effects of different task difficulties can be minimised.

- **Tasks on a similar time-scale**

  Similar to the previous requirement, another possible confound in this research is the timescale of the tasks for each group. It is possible that to

perform a given task, the more time a group has, the better outcome a group may achieve. However, this research does not investigate how the timescale can affect the group performance. Therefore, it is necessary to make sure that all groups follow a same timescale to finish the given task. Consequently, the effect of this possible confound can be minimised.

- **Moderate task time-scale**

  Another requirement of the time-scale of the tasks is specific duration of the tasks. Group EI may fluctuate when a group is initially organised [9]. Although exploring how long it takes for the measured Group EI to become stable is outside the topic of this research, it is still expected that Group EI is measured when it is stable, as a stable measurement is more representative. Thus, it is expected that the duration of the task for each group is long enough for the measured Group EI to become stable. On the other hand, once the measured Group EI becomes stable, a prolonged task duration may not have significant impact on Group EI. In other words, a prolonged task duration will not affect the results from the experiment. Considering the time limitations for this research, a prolonged task is not expected to be performed by the groups. As a result, a moderate task time-scale is expected for each group.

- **Objective measurement of the task outcomes**

  As one of the research topics is the relationship between Group EI and group performance, it is necessary to have a way to measure group performance. In this research, as the Group EI is measured during the period in which groups are asked to perform tasks, it is believed that the best way to measure the group performance is to measure the task outcomes from each group. Therefore, it is of paramount importance that the outcomes from the tasks which are performed by each group can be objectively measured. For example, the outcome from a crossword task can be objectively measured using the correct word rate. On the other hand, if the task is to make a room more beautiful, the outcome from such a task cannot be objectively measured, because

whether a room is beautiful is a subjective opinion. If the outcome cannot be objectively measured, it may introduce more confounds when analysing the results. Therefore, it is expected that the outcome from the tasks which are performed by each group can be objectively measured.

## 4.5 Participants Tasks

In this research, as the participants are students doing a Masters degree in the same subject, their Masters project was chosen to be the task for each group. This task was chosen based on the following considerations:

- **Project Requirement -** The first and the most important consideration is that the way the students carry out their Masters project meets the scenario of this research. According to the project requirements, the project must be carried out in the unit of a group.

- **Project Difficulty -** The participants are doing the same subject for the degree. Therefore, the project difficulty between different groups is generally at the same level, despite the topic for each group being different. As the difficulties are similar between groups, it is possible to rule out the possibility of the results being confounded by the difficulty of the tasks being different between groups.

- **Project Time-scale -** The Masters project for the students in this subject is started in January and finished in September. There are nearly eight months for the students to settle into the groups and to build up a relationship within the group. Furthermore, the time-scale does not change between groups. Therefore, this rules out the possibility of the results being confounded by the task time-scale.

- **Project Outcome -** The outcome of the project is measured as the final mark of each group, based on strict rules set by the university. Therefore, it is believed that the final mark of the project is an objective measurement

of the group's outcome, which can subsequently be used as an objective measurement of group performance. This measurement will be valuable to this research.

## 4.6 Questionnaire Design, Content and Choice

After the discussion of research method (Section 4.2.2) and research design (Section 4.3), two questionnaires are required to be designed and chosen for the current research, a Group EI measurement and a 360-degree assessment to assess the weight coefficient of each group member in the group work.

### 4.6.1 The Short Version of the WEIP-Ss

Through a review of the EI literature (Chapter 2), two widely used tools for measuring Group EI were revealed which could be applied to this research. These are Group Emotional Intelligence Norms (GEI Norms), and Workgroup Emotional Intelligence Profile (WEIP).

According to the Group EI Norms model proposed by Druskat and Wolff [9] (Section 2.3.4), Group EI Norms focus on three distinct levels: individual level, group level and cross-boundary level. The individual level refers to interpersonal EI, which includes group awareness of members and group regulation of members. The group level focuses on the group's ability to deal with emotions, which includes group self-awareness and group self-regulation. The cross-boundary level refers to relationships or interactions between different groups. While WEIP focuses on abilities relating to dealing with people's own emotions (interpersonal ability), such as emotional self-awareness and emotional self-management and abilities relating to dealing with other people's emotions (intrapersonal abilities), such as the group's emotional awareness and the group's emotional management. The core abilities of both GEI Norms and WEIP are the individual EI level and the Group EI level. The data sample used in this research is graduate project groups, and their group structures are multi-channel HRM communication structure as reviewd in section 2.3.1. There was no cooperation or collaboration between different groups.

As a result, this research design focuses on building Group EI at the individual level and group level. Thus, WEIP was chosen as the most suitable instrument for measuring Group EI in the current research.

WEIP-S (see Appendix A), a short version of WEIP, is a self-report questionnaire to measure the EI of individuals in groups. WEIP-S comprises four abilities, awareness of own emotions, management of own emotions, awareness of other's emotions, and management of other's emotions. There are four items in each ability, which takes approximately 15 minutes to complete. For each item, participants are required to choose whether they agree or disagree with the statement (e.g.,'I can explain the emotions I feel to team members') based on a 7-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = disagree somewhat; 4 = undecided; 5 = agree somewhat; 6 = agree; 7= strongly agree). A high score indicates a higher level of EI in the group. Jordan and Lawrence [128] demonstrate that the reliability of WEIP-S through Test-retest is good, with average reliability of 0.82.

### 4.6.2 360-degree Assessment

In this research, the 360-degree assessment (see Appendix B) is used to measure the weight coefficient of each group member on Group EI. The influence is based on each group member's contribution to the establishment of Group EI, which depends on individual behaviour in the group work. The result of assessment can be used to assess each group member's proportion of Group EI. According to the reviews in Chapter 2), seven dimensions which related to EI are chosen in order to assess group member's proportion in the 360-degree assessment as following:

- **Leadership**

  Edum-Fotwe and McCaffer [15] listed five main skills that are prerequisite for the position of project management. These skills are leadership, communication, problem-solving, negotiation and marketing. All of these are important components of the EI construct [16]. Based on the data source selection, there are two roles in each group: group leader and group members. Thus,

the first dimension is designed for group leader, which assess to the leadership in a group. For example, the participants are required to choose an answer to the question ("Do you think your group leader can arrange and coordinate your group members' work reasonably") based on a 5-point Likert scale (1 = Not at all reasonable; 2 = Slightly reasonable; 3 = Moderately reasonable; 4 = Quite reasonable; 5 = Extremely reasonable).

- **Attendance**

  Reviews in Section 2.5.1 claims that individual effectiveness includes the degree and quality of member's efforts, their level of initiative, cooperation with other employees, absenteeism, lateness, and commitment to the job. In the case study, each group scheduled group meetings to discuss how to complete the project. Absenteeism and lateness is a significant concern for many groups or organisations, which use such information to gauge the effectiveness of their efforts and to plan for future efforts. Thus, attendance is one dimension designed for all group members, which required to be assessed in the 360-degree assessment. For example, the participants are required to choose an answer to the question ("how often is your coworker late to the meeting?") based on a 5-point Likert scale (1 = always; 2 = most of the time; 3 = about half the time ; 4 = once in a while; 5 = never).

- **Work**

  As reviews in Section 2.5.1, individual performance is involved in forming a group member's attitude; it refers to each member's participation, and whether they work actively and conscientiously. For example, the participants are required to choose an answer to the question ("how often does your coworker meet your group's deadlines?") based on a 5-point Likert scale (1 = never; 2 = once in a while; 3 = about half the time; 4 = most of the time; 5 = always).

- **Communication**

Gardener [28] suggests that communication abilities and conflict resolution abilities are two important abilities involved in interpersonal abilities. George [82] argues that accurate appraisal and expression of one's emotions is necessary for people to develop beneficial interpersonal relationships, to communicate with others about their needs and thus to fulfil their goals through high-level job performance. Combined with the structure of the sample groups, a multi-channel HRM communication approach, each group member needs to communicate with others to share their ideas and thinking in order to complete their project together. Thus, for example, the participants are required to choose an answer to the question ("how well does your coworker communicate with others?") based on a 5-point Likert scale (1 = Not at all well; 2 = Slightly well; 3 = Moderately well; 4 = Very well; 5 = Extremely well).

- **Conflict resolution**

Conflict is an inevitable part of work, if there is any disagreement between group members in their group meetings. In the study of Edum-Fotwe and McCaffer [15], conflict resolution is one factor which are prerequisite for the position of project management. In addition, reviews in Section 2.2.6 shows the relationship between EI and conflict resolution. There are a wide range of methods and procedures for conflict resolution. How to deal with conflict is an essential skill in group work, especially for the group leader. Thus, for example, the participants are required to choose an answer to the question ("If there is any conflict between your group members, do you think your group leader can deal with conflict reasonably?") based on a 5-point Likert scale (1 = Not at all reasonable; 2 = Slightly reasonable; 3 = Moderately reasonable; 4 = Quite reasonable; 5 = Extremely reasonable).

- **Respect**

The result from the study of Luca and Tarricone [148] shows that respecting different personalities, cultures and sensitivities is one important factor

of empathy. In this research, members in each group come from different countries with different culture backgrounds. Respect refers to one's attitude to other group members. Thus, respect is other dimension in the 360-degree assessment. For example, the participants are required to choose an answer to the question ("Can he/she patiently listen to others' suggestions?") based on a 5-point Likert scale (1 = Not at all well; 2 = Slightly well; 3 = Moderately well; 4 = Very well; 5 = Extremely well).

- **Trust**

  The definition of Druskat and Wolff [9] indicates that the purpose of developing Group EI is to build the trust within group, and improve group identity and group efficacy. Trust reveals that one group member is able to trust other members and also can be trusted by others. Furthermore, it reveals the relationships between group members. In order to measure this dimension, the participants are required to choose an answer to the question, such as "Do you think you can trust him/her, for example, you can tell the truth to him/her, even when you know that will be better off by lying?", which based on a 5-point Likert scale (1 = Not any trust at all; 2 = A little trust; 3 = A moderate amount of trust; 4 = A lot of trust; 5 = A great deal of trust).

- **Comment Area**

  In final, there is some comment areas for participant to comment their opinions, which opinions include the influence of each member's EI on their teamwork, anything they could improve, or feeling in one-year group work. The comment could help this research understand the impact of Group EI on the teamwork from participants' perspective.

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Overall, participants can describe their overall feelings in one-year group work, whether they were satisfied with their cooperation and collaboration in detail. Each

group member is required to evaluate every other group member and themselves. There are 16 question for each group member's assessment. In total, it takes approximately 20 minutes to complete. The weight coefficient of each group member can be found from the average of other group members' evaluations. A high score indicates a more positive influence on the group.

## 4.7 Overview of Research Design

After research methodology and research design, the protocol for this research can be summarised as follows:

### 4.7.1 Introduction to this research

This research will explore a more accurate method to measure overall Group EI. The aim is investigating whether a team, whilst undertaking a project, exhibits a group, or collective emotional intelligence and if they do, whether this has an impact on the project efficiency.

### 4.7.2 Case Study Questions

- How can overall Group EI be more representatively measured compared to existing approaches?
- What is the Group EI's influence on group performance?

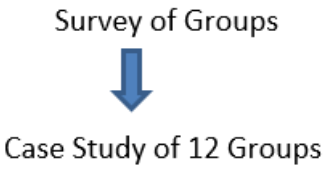
**Hypotheses:**

- H1: The weighted average of individual EI scores, as an indicator of the overall EI of a group, based on the contributions of different roles to team-based work is more representative than the average of individual EI.
- H2: Group emotional intelligence is likely to have a positive influence on group performance.

### 4.7.3 Data Collection Procedures:

- Participants: MSc Engineering Management Students. 72 people, 12 groups.

- Multi-case study within a survey




- Survey: The short version of Workplace Emotional Intelligence Profile (WEIP-S), and 360-degree assessment for individual influence in the groups.

- First data collection: January to the end of March, 2015

  First data collection must be finished from January to the end of March. It is necessary to attend all group meeting for each group during this period. In the meeting, take the meeting notes and observe the group member's behaviours. WEIP-S is required for measuring.

- Final data collection: April to End of September, 2015

  The final data collection must be finished in this period. It includes WEIP-S and 360-degree assessment for group performance. Test the initial findings.

### 4.7.4 Outline of Case Study Report

- One case study analysis for each group

- Outcomes from the practice, to date

- Verify hypothesis

## 4.8 Research Validity & Reliability

For the results from a study to be meaningful and significant, it is necessary to consider the validity and reliability of that research. The research validity refers to the credibility or trustworthiness of the research results, whereas the research reliability refers to the reproducibility of the research results [171].

For example, if a study claims that an all-female group will perform better than an all-male group, however, the methodology of that research indicates it used groups with a female majority and groups with a male majority as research participants. Then, this research will be considered as having low validity because the research participants did not reflect the case for which the research is making a claim.

Similarly, if the results from one study can only be produced once and have no statistical significance, such research can be considered as having low reliability. As the research with low validity and reliability can be considered as giving no contribution or a less significant contribution, it is therefore important that the proposed methodology in this research has both validity and reliability. The rest of this section discusses in detail how the proposed methodology in this research provides sufficient validity and reliability.

### 4.8.1 Research Validity

One of the important aspects of any case study report is to validate the quality of the study. As the research validity is referred to as the credibility or trustworthiness of the research results, it is believed that if the research results are obtained using objective approaches and based on existing well accepted knowledge, the validity of the result can be assured. Gibbert et al. [173] utilized the terminology 'construct validity', to refer to the quality of the conceptualization or rationalization of the relevant concept. This indicates the extent to which a study has investigated what it claims to investigate. In other words, the extent to which a procedure leads to an accurate observation of reality. Yin [149] recommends researchers to establish a clear chain of evidence, to allow any reader to reconstruct how the researcher went from the initial research questions to the final conclusions. Yin says *"The reader should be able to conclude, independently, whether a particular interpretation is valid....Present enough evidence to gain the reader's confidence that the investigator knows his or her subject"*. Eisenhardt and Graebner [174] suggest that in any case study, the story should typically consist of a narrative format with quotations from the key informants and other supporting evidences. This story, according to these authors, should be intertwined with the theory to demonstrate the

close connection between empirical evidence and emergent theory. Another recommendation by Yin [149] to address the 'construct validity' is by getting the cases reviewed by peers and experts. The author believes that from a methodological viewpoint, the corrections made through this process would enhance the accuracy of the case study, thereby increasing the construct validity of the study.

Following such a belief, the design of this research focuses on extracting objective measurements from the participants. For example, the measurements of group performance uses objectively measurable parameters like total time of meetings, effective time during each meeting etc. At the same time, existing and well acknowledged questionnaires are also used to explore the real opinions of each participant. On top of these data collection approaches, the data analysis approaches adopt both qualitative and quantitative analysis, so that the weakness of each data analysis approach can be overcome. The supervisor and advisor of this thesis had also checked whether the EI characteristics of each case has been captured accurately and representatively. Moreover, in order to confirm the accuracy and representative interpretations of observation, the researcher, supervisor and thesis advisor repeatedly reviewed and discussed each case. Nonetheless, due to the ethical considerations and requirements, the videos and more detailed information of this research cannot be shared with people other than the supervisor and the thesis advisor. In addition, parts of this research has presented these case studies in one conference papers with "Best Paper and Presentation Award": "A Weighted Group EI Incorporating Role Information for More Representative Group EI Measurement" presented in the 21th International Conference on Social Intelligence and Emotional Intelligence (ICSIEI) held in Madrid, Spain, (March, 26-27, 2019). This paper was peer reviewed. Having feedback from both the reviewers and conference participants has helped this research to improve the case study design and address the construct validity of the cases. Therefore, it is believed that the results from this research are credible and trustworthy, and the research validity is assured if the proposed methodology is followed in this research.

### 4.8.2 Research Reliability

This research looks at aspects where human behaviour can play a significant role in the result. However, human behaviour may change over time, depending on a vast amount of reasons. Therefore, it is considered to be hard to reproduce exactly the same result for the same group of participants at different times. For example, it is not guaranteed that the result from Group A obtained today can be reproduced in ten years with the same group of people, as they may change a lot during those ten years, even if they are the same person. However, such limitations do not necessarily mean that this research has poor reliability.

In this research, many procedures have been carried out to assure the research reliability. For example, a number of groups of participants were used to obtain the results in this research. Each group of participants was in similar circumstances. They were all organised into groups at the same time for the same duration. The tasks they performed were of similar difficulty. The measurements of each group were taken at roughly the same time. The outcomes from their tasks were assessed following the same rules. Also, some of the measurements were taken multiple times, which is known to be an useful way to improve reliability [171, 45]. As well as these procedures, the analysis of the collected data includes a statistical significance analysis, which uses a statistical approach to show the reliability of the results. Following these procedures and analysis approach, it is believed that the results from this research are reliable.

## 4.9 Ethical Consideration

Yin [149] raises the requirements for human participant protection which is usually referred to as ethical issues. More specifically, Yin has summarised the following four aspects where care needs to be given to the participants [149]:

- **Consent Agreement -** It is important to sign a consent agreement between the researcher and participants. The consent agreement includes explaining the research to the participant, alerting the participants about the possible

side effects, and explaining that participating in this research is fully voluntary and no one will be forced to participate. By signing the agreement, it means the participant has acknowledged all aspects regarding the research and the participant is still willing to participate voluntarily.

- **Harmless -** It is the responsibility of the researcher to ensure that the research design is harmless to the participants both physically and mentally.

- **Privacy and Confidentiality -** It is also the responsibility of the researcher to ensure the participants' privacy and confidentiality, as the research may ask the participants to express their private thoughts, opinions or experiences, which the participants may not want to be shared in public.

- **Special Precautions -** Depending on the research topic and participant's specific circumstances, some may require special precautions. For example, this research records the behaviour of each participant during their work on a Masters Degree project. The special precaution in this research will be to ensure the final mark awarded to each group and each individual is entirely based on the quality of their work regarding the university's regulations. None of the recorded behaviour during this research should be used to assess the participants' project quality.

Following these aspects, the ethical consideration of this research will be discussed. First of all, a consent agreement, which involves all the necessary details of the research, the responsibility of the researcher, and the promises from the researcher, has been approved by the ethical committee in the university where this research is carried out. The approved version of the consent agreement will be explained to and signed by the participants ahead of the research.

On top of this, participants have been given the option to stop participating in the research at any time if they feel uncomfortable being participants in this research. It can be said that the participants can voluntarily choose to participate in this

research based on the most possible information that can be shared by the researcher. Therefore, it can be said that the participants are protected before the research. Secondly, this research does not involve any physical contact and the participants are only required to do whatever they would normally do during the research. Therefore, it can be said that the participants are also protected during the research.

The main ethical consideration will be the privacy and confidentiality of the opinions, thoughts or experiences that are expressed by the participants during the research. In order to assure the privacy and confidentiality, the researcher will attend all data collection events when using the questionnaires, to ensure no third person can see the contents in the questionnaires. After the data collection, the data from the physical questionnaires will be entered into Microsoft Office Excel which will then be encrypted so that no third person can see the data. The encrypted files will be stored on the university's online storage facility, which aims at preventing the threat of data compromise due to the loss of a personal computer. At the same time, the physical questionnaires will then be locked in a university provided drawer. These procedures will ensure the best privacy and confidentiality that the researcher can provide.

For the last aspect, as discussed in the example, it is important that this research does not affect the participants' project mark. Based on aforementioned procedure of ensuring privacy and confidentiality, all the research data is secured and only the researcher can access the data. As a consequence, the researcher becomes the biggest threat of data compromise. In order to ensure the objectivity of the participants' project mark, the researcher remains independent and is not involved in the process of marking the participants' projects in any way. Based on these procedures, the ethical committee of the university in which this research is carried out has granted permission to carry out the designed research following the procedures discussed in this chapter.

## 4.10 Summary

In summary of this chapter, the research methodology used in this research is explained. The methodology is proposed based on the research philosophy that is held by both the author of this thesis and researchers in the relevant domains. Overall, this research is deductive research, as the research questions and the hypotheses to the research questions have been proposed prior to the conducting of the research. In order to provide evidence toward the research questions, the proposed methodology uses a case study and a survey strategy to conduct the research. The data analysis adopts a mixed-method data analysis approach, which drafts the conclusion based on both quantitative and qualitative methods. On top of the research methodology, the requirements of the research and the procedures that have been taken to fulfil the requirements have also been introduced in detail. The research tools (in this case, the questionnaires) that are used in this research have also been introduced in detail including the way in which the tools are designed. The selection of participants in this research is discussed. The proposed research methodology has been submitted to the research ethics committee in the university where this research is carried out. The committee has granted permission to carry out the research following the procedures on the selected participants. Therefore, the research was carried out accordingly. The results obtained in this research will be presented in the next chapter.

# Chapter 5

# RESULTS AND FINDINGS DISCUSSION

This chapter presents the main results and findings from the current research. As alluded to in Chapter 4, the current research was composed of three research stages, and the data were collected from two sources, which included a questionnaire survey (WEIP-S and 360-degree assessment) of 70 MSc Engineering Management (EM) students, and 12 case studies of 12 EM groups. The quantitative data were analysed using Excel 2016 for descriptive statistics and inferential statistics; the qualitative data were analysed using a descriptive case study. The final section of this chapter presents a discussion of the results of the case study and statistics questionnaires. Subsequently, recommendations for enhancing Group EI are presented.

## 5.1 Findings from Case Study

This section mainly presents the results and findings from the case study. The case study focused on 12 groups consisting of 70 Masters students enrolled on the Engineering Management (EM) MSc at the University of York. The findings from the case study are a way of capturing the Group EI characteristics of each group and examining each group's performance. This research is focused on group work, and each group is one unit of research data sample. According to the consent agreement and ethical approval, if any member of a group wanted to withdraw

from the research study, data from the whole group becomes invalid. Thus, the final valid data for the case study in this research consists of 8 project groups with 48 students. This involves 26 females and 22 males with a mean age of 23.68 years (S.D.=2.02) (range from 21 to 31). The results are presented in the form of tabulations and figures.

This research recorded all group meetings of the 8 groups using video or audio from the beginning to the end of the project. Based on the findings of Luca's study [148], the qualitative data were analysed in terms of a descriptive case study, and results are presented in the form of tabulations and figures. Furthermore, some conversations and comments are quoted from meeting videos and questionnaires.

### 5.1.1 Case Study 1

Group 1 was composed of 3 males and 3 females with a mean age of 23.33 (S.D =2.13) (range from 22 to 28). They came from different countries and had different cultural backgrounds.

From observing and analysing this group's meeting notes and videos, this group is a team with high Group EI characteristics according to Luca's results (discussed in Section 2.5.5). The Group EI characteristics of Group 1 are summarised in Table 5.1.

**Leader's EI characteristics**

The group leader was a 23-year-old male. He arranged group meetings on a schedule and notified everyone in advance. Before each meeting, he prepared questions and tasks on the list. During the meeting, he encouraged his group members to share their ideas and emotions, and he was able to present his ideas and emotions clearly. Moreover, when group members presented their ideas and feelings, he could respond to them and make a decision quickly. For example, one male student was late in one meeting, he was aware some members felt upset and he made a quick decision saying:

Table 5.1: Group EI Characteristics of Group 1

| Group 1 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions, others' emotions and possible impact they could have on the team<br>• Group members had an ability to express their emotions clearly. | N/A |
| **Self-regulation** | • Group leader facilitated the smooth progress of the project, and promoted the positive working relationship with group members to complete the work.<br>• Group members had the ability to regulate their emotions and their behaviours. | N/A |
| **Motivation** | • Group was goal oriented, and each group member focused on their project.<br>• Group leader set meeting agenda and notified everyone in advance.<br>• Group members quickly encouraged themselves into topic and work in their meetings, and everyone could complete their own works in advance.<br>• Group members felt comfortable and relaxed during the meeting. | There was rarely any group member that was overly relied on group leader. |
| **Empathy** | • Group members could feel the support during discussion.<br>• Group members could listen to and understand others' ideas, and respected each other when they had different ideas.<br>• Group members respected different personalities, cultures, and backgrounds. | N/A |
| **Social Skills** | • Group members communicated with their supervisor actively and appropriately in a timely manner. They communicated with other groups.<br>• The group felt that developing a healthy working environment with good relationship was important.<br>• Group members often socialised together. | N/A |

> *OK, we can wait another 10 minutes. After 10 minutes, we will start our meeting no matter he comes or not. I will email our meeting notes and tasks to him if he cannot attend this meeting.*

In addition, the leader had an ability to solve problems and conflicts between group members. He arranged each member's work properly so that he facilitated the smooth progress of the project. He promoted a positive working relationship between group members to finish their work. Thus, all group members agreed that he was a responsible and conscientious leader. One female member aged 22 years commented:

> *He is a responsible, earnest and friendly group leader. We feel relaxed and pleasure when we work together.*

Another male members aged 28 years commented that:

> *He scheduled our meeting and communicated with us timely and actively. He was responsible for his work and encouraged us to work as a group. I can trust him and does not hesitate to help us if we need.*

One female member aged 22 years pointed out that the leader's emotional understanding and emotional awareness was important for group work. She said:

> *Our leader has an ability to be aware of our feelings and emotions, and respect our feelings. He can listen our ideas carefully and explain his opinions patiently even if we have disagreement.*

**Self-awareness**

Group 1 were able to be aware of their own emotions and others'. They tried to understand each other's ideas and feelings during the meeting. For example, if a group member was late in one meeting, this member felt very apologetic for other group member and explained the reasons. He/she also emailed the group leader their work in advance, in order to reduce the effect of his/her lateness. At the

same time, other group members understood that member and did not express any negative emotions to that member. If problems occurred, they could communicate with each other in a timely way, and tried to sort out problems as soon as possible, by trying to be aware of other problems.

**Self-regulation**

Group members had the ability to control their emotions and understood the possible impact of their emotions on the group work. Everyone could regulate their behaviours in order to avoid any negative impact on their project and relationships.

**Motivation**

Their group meetings were very effective. The group focused on the project and everyone worked hard. They looked up a lot of information and prepared their own work before their group meetings. Everyone actively participated in discussions during the meeting.

**Empathy**

Although the members of Group 1 came from different countries with three of them from the same country, they could respect each other's culture and background. This was manifested in them all speaking English when they got together. The three students from the same country never spoke their own language, in order to avoid misunderstandings and feelings of discomfort between other members. After they completed their project, every member felt pleasure and relaxed about this one year study.

**Social Skills**

Group members communicated with their supervisor actively and in a timely way, and communicated with other groups. The group felt that developing a healthy working environment with good relationships was important. Group members often socialised together. Overall, Group 1 was a high-efficiency group. This was also agreed with by their supervisor.

Table 5.2: Group performance characteristics of Group 1

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 70 | 64 | 4 | 100 hours | 99.9 hours | 100% | 100% |

**Group performance**

After each group completed their project, they needed to submit a project report and give a presentation to present their project results. The outcome of the project was measured as the final mark of each group given by three supervisors, based on the strict rules set by the department of the university.

One issue of previous studies is measuring group performance using an average of individual results. Therefore, in order to compare the group performance measurement of this research with existing measurements, the first group performance characteristic is the group mark, based on the project report and the whole project work evaluation, which was issued by the three supervisors in the Department of Electronics. The average mark is the mean of individual project marks of group members in one group. S.D. is the standard deviation of the individual project marks of each group member. On the basis of the introduction about quantitative measurements from the case study in Section 4.3.1, the group performance characteristics of Group 1 are summarised in Table 5.2.

For Group 1, the average mark (64) was slightly lower than the group mark (70). Standard deviation (S.D.=4, range from 57 to 69) quantifies that the amount of dispersion of individual marks of each group member is small. They spent 100 hours in total on the project work, and 99.9% was effective time, due to their high motivation. This also demonstrates that all the group members focused on the project and were encouraged to work quickly. They finished their work before all deadlines, and everyone felt there was a healthy working environment with good relationships.

### 5.1.2 Case Study 2

Group 2 was composed of 3 males and 3 females with a mean age aged 24 years (S.D =2.77) (range from 22 to 30). They came from three different countries and

had different cultural backgrounds. From observing and analysing this group's meeting notes and videos, the Group EI characteristics of this group are summarised in Table 5.3. Compared with Group 1, Group 2 is a team with a certain amount of low Group EI characteristics.

**Leader's EI characteristics**

The leader of Group 2 was a 30-year-old male. The group leader could not arrange group meetings to a schedule and notify everyone in time. In some situations, he arranged a group meeting in hurry, when a deadline was coming. This resulted in some students not able to attend the group meetings on time and some students were even absent from group meetings. During the meetings, he was unaware of group members' emotions and the possible impact they had on the team. In one meeting, a group member was late to the group meeting by about one and a half hours. He failed to do anything to rearrange the meeting and to understand members' emotions, although some student started to get upset and anxious. That resulted in group members feeling the situation was unfair and being worried about their project. Meanwhile, group members thought they could not trust their leader, and felt it was difficult to share their ideas and feelings. When group members presented their ideas and feelings, he often ignored group members' feelings, as he was not good at solving problems or conflicts between group members. When problems occurred, group members tended to take it personally. One female group member aged 23 years commented that:

> *I felt he is an invisible group leader, he failed in his duty.*

Another female group member aged 22 years also commented that he was absent from his job. The group leader's job was important in the group work:

> *He hasn't fulfilled his responsibility, because he nearly didn't do anything about one leader's job. Including arrange group meeting, communicate with us about work, communicate with our supervisor, and so*

Table 5.3: Group EI Characteristics of Group 2

| Group 2 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions. | • 1/3 of group members seemed unaware of others' emotions and possible impact they could have on the group.<br>• Some group members did not have the ability to express their emotions clearly.<br>• Group leader mostly ignored group members' emotions, even when they were having conflict in the meeting.<br>• When problems occurred, group members tended to take it personally. |
| **Self-regulation** | • 2/3 of group members had the ability to regulate their emotions and their behaviours. | • Some group members were unable to regulate their emotions well under stress. They were overly emotional and personal in communication.<br>• Group leader was unable to facilitate the smooth progress of the project.<br>• One group member was easier to be upset and get angry, he often pushed others to accept his ideas in an aggressive way. |
| **Motivation** | • Some group members focused on their project.<br>• Group leader set meeting agenda and notified everyone in advance. | • Most group members did not clearly understand their tasks.<br>• Group members lost motivations, 1/3 of group members were unable to attend their group meetings on time.<br>• Group members started their works and topic slowly during the meeting, and 2/3 of group members were unable to finish their own work before the meeting.<br>• Group leader did not have any counterplan when group members did not finish their work. |
| **Empathy** | • Group respected different cultures and backgrounds.<br>• 2/3 of group members could carefully listen to others' ideas, and respect everyone even if they have different ideas. | • 1/3 of group members thought their ideas were absolutely right.<br>• When one group member became upset or angry, other members did not try to understand why.<br>• One group member always considered others' inadequacies as "downfall".<br>• Everyone had many complains. However, nobody tried to express.<br>• Group members felt uncomfortable and depressive during the meeting. Some of them felt alienate and did not feel part of them. |
| **Social Skills** | • Group communicated with their supervisor actively and appropriately in a timely manner. | • Lack of communication with other groups, and they were unaware of communication problems. |

*on. We need one group leader is good at promoting the positive working relationships with group members. Mostly we worked individually and are lack of communications.*

A male group member aged 22 years pointed out that emotional awareness and emotional expression were important when working in a team:

*He didn't has an ability to attend to other people's emotions and understand group members' situations. Even if he realised our feelings and emotions, he mostly ignored it. He did nothing about group leader's responsibility.*

**Group Self-awareness**

Most members of this group were only aware of their own emotions. They did not have the ability to be attentive to others' emotions and the possible impact they had on the group. The group did not know how to express their feelings, and they were often overly emotional and personal in communication. In particular, one male student aged 23 years, (A), constantly thought he was unquestionable and very easily became aggressive if anyone doubted his ideas.

**Group Self-regulation**

Most group members understood about regulating their behaviour to avoid conflict between them. However, student A was unable to control his emotions during group meetings. He often pushed others to accept his ideas using sentences like:

*This idea is terrible, you look so unenlightened.*

*Why do you often ask so mindless question?*

*Who tell you this understanding?*

*Can you think one question by your brain?*

This resulted in most group members being unable to express their ideas and feelings actively. Most people preferred to work individually.

**Motivation**

Group members lost motivation. One third of group members were unable to attend the group meetings on time, without notification or apology. In group meetings, group members started their work and topic slowly, as most of them were unable to finish their own work before the meeting. Moreover, most group members did not clearly understand what their tasks were. The group leader did not have any counter plan when group members did not finish their work.

**Empathy**

Group member A considered others' inadequacies as “downfalls" excluding himself. In this situation, the other members often privately complained that they felt depressed when they worked with student A, but no one tried to understand him and to communicate with him.

Three group members come from one county. These three students often spoke their own language when they worked together. This resulted in the other three members not being able to understand what they were saying and feeling embarrassed and uncomfortable. Meanwhile, this reflects that Group 2 did not have enough for respect all group members. Although the group leader was aware of the dissatisfaction of the group members, he often ignored it and did not try to facilitate a healthy working environment. Overall, Group 2 did not behave like a team, as everyone did not feel they were part of one group.

**Social Skills**

Group 2 could communicate with their supervisor on time and actively, as the department required. However, the group had almost no communication between group members in private. In addition, they never communicated with other groups to share ideas and experiences. Overall, Group 2 had a lack of self-awareness, self-regulation, communication, empathy and motivation.

Table 5.4: Group performance characteristics of Group 2

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 65 | 65 | 9 | 360 hours | 110 hours | 50% | 20% |

#### Group performance

The group performance characteristics of Group 2 are summarised in Table 5.4. For Group 2, the average mark (65) is the same as the group mark (65). Standard deviation (range from 52 to 80) is 9, it quantifies the amount of variation or dispersion of individual marks is large. They spent a total of 360 hours on project work. However, only 110 hours were effective time. This means they spent a lot of time on invalid work, and did not know about time management. This also demonstrates that Group 2 was lacking motivation and communication between group members. Group 2 only meet 50% of their deadlines, and 80% of group members felt uncomfortable and depressed during the group work.

### 5.1.3 Case Study 3

Group 3 was composed of 3 males and 3 females with a mean age aged 24.83 years (S.D =2.91) (range from 22 to 31). They came from three different countries and had different cultural backgrounds. From observing and analysing this group's meeting notes and videos, Group 3 is a team with mostly high Group EI characteristics and a few low Group EI characteristics, which are summarised in Table 5.5.

#### Leader's EI characteristics

The leader of Group 3 was a 25-year-old male. Most group members thought he was an earnest and self-disciplined leader. One male group member aged 24 years commented:

> *He is a hard-working leader with some introverted personalities. He can share his ideas with us when we work together. But sometimes, I cannot distinguish his emotions as he often looks serious.*

Table 5.5: Group EI Characteristics of Group 3

| Group 3 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions, others' emotions and possible impact they could have on the team<br>• Some group members had the ability to express their emotions clearly. | • Sometimes, group leader was delayed in responding to others' emotions. |
| **Self-regulation** | • Group members had the ability to regulate their emotions and their behaviours so that they did not have any the negative impact on the project. | N/A |
| **Motivation** | • Group was goal oriented, and each group member focused on their project.<br>• Group members quickly engaged themselves into topic and work in their meetings, and everyone could complete their own work in advance.<br>• Group leader often prepared the counterplan in order to avoid the case where group member could not finish the task.<br>• Group members felt comfortable and relaxed in the meeting. | • In some situations, group leader could not set meeting agenda and notify everyone in advance.<br>• In some situations, some group members tended to work personally. |
| **Empathy** | • Group members could feel the support during discussion.<br>• Group members could listen to and understand others' ideas, and respected everyone even if they have different ideas.<br>• Group members respected different personalities, cultures, and backgrounds. | N/A |
| **Social Skills** | • Group members communicated with their supervisor actively and appropriately in a timely manner. They communicated with other groups. | • When problems occurred, group members were unable to communicate with each other appropriately in a timely manner. |

Another female student aged 31 years said:

> *Absolutely he is a conscientious leader. He communicated with our supervisor actively if we have any questions about the project. I just think sometimes his arrangement is unreasonable. For example, sometimes he notices us to take a group meeting suddenly when we are on holiday, or arranges many works when we are very busy preparing for examinations. I prefer if he could reasonably arrange our meeting and our work.*

These opinions also are reflected in group meeting notes and videos. The leader could arrange group meetings to a schedule. During group meetings, the leader was aware of his own emotions and expressed emotions clearly. He paid too much attention to work, so that he delayed responding to other's emotions sometimes. The leader tried to facilitate the smooth progress of the project and solve problems. He made quick decisions and was responsible for the decision if there was a disagreement between group members. The group leader often prepared a counter plan in order to avoid group members missing deadlines. He would email group members to track their work progress and remind them to submit their work in time. He could respect different cultures and personalities of group members.

**Group Self-awareness**

Group members were aware of their own emotions and those of others and the possible impact they could have on the team. Most of them had the ability to express their emotions clearly. During group meetings, they shared their ideas and feelings.

**Group Self-regulation**

Group members had the ability to control their emotions and their behaviours so that they did not have a negative impact on the project. Although they had different opinions, they tried to understand other's feelings and respect others. At the same

time, they could explain their ideas and feelings carefully and patiently. They often presented ideas with sentences like “How about we...",“Can we try...", and “Why not consider. . . ".

**Motivation**

The group was goal oriented, and each group member focused on their project. They could quickly participate in a discussion during their meetings, and half of them could finish their own work before the meetings. Most of them realised that creating a healthy working environment was necessary in order to ensure smooth progression of the project.

**Empathy**

Group members felt supported in discussing problems. They could carefully listen to others’ ideas, and respect different cultures, personalities, and backgrounds. Most of them were willing to help group members when they met any problem. On the whole, group members felt comfortable and relaxed in the meeting time.

**Social Skills**

Group members communicated with their supervisor actively and on time. Sometimes, they were lacking in communication due to unreasonable arrangements. In that situation, they preferred to work alone and solve problems by themselves.

**Group performance**

The group performance characteristics of Group 3 are summarised in Table 5.6. The average mark (66) is similar to the group mark (68). Standard deviation (S.D.= 3, range from 62 to 70) of individual marks is smaller than Groups 1 and 2. It means the variation in individual course marks is small. They spent 160 hours in total on project work, and 100 hours was effective time. Group 3 were able to finish all the department’s deadlines, and missed 40% of the internal deadlines set by themselves. 80% of group members felt comfortable and relaxed during group work. They just felt it was difficult to work under stress.

Table 5.6: Group performance characteristics of Group 3

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 68 | 66 | 3 | 160 hours | 100 hours | 60% | 80% |

### 5.1.4 Case Study 4

Group 4 was composed of 3 males and 3 females with a mean age aged 23.5 years (S.D =1.71) (range from 22 to 27). They came from three different countries and had different cultural backgrounds, with three of them coming from one country. From observing and analysing the group's meeting notes and videos, Group 4 is a team with mostly high Group EI characteristics and a minimal amount of low Group EI characteristics, which are summarised in Table 5.7.

#### Leader's EI characteristics

The group leader was a 27-year-old male. He arranged group meetings to a schedule and notified everyone in time. Before each time meeting, he communicated with the supervisor in advance to report their current work and to ask what to do next. He had the ability to encourage his group members to share their ideas and emotions in discussion, and he was able to present his ideas and emotions clearly. Moreover, when group members presented their ideas and feelings, he listened to them carefully.

The leader was good at solving problems and conflicts between group members. If group members felt disappointed in their work, he comforted them and inquired whether they needed help. He arranged each member's work properly, so that he facilitated the smooth progression of the project and promoted a positive working relationship between group members to finish their work. Thus, all group members agreed that he was a responsible and conscientious leader.

#### Group Self-awareness

Group members were aware of their own emotions, other's emotions and the possible impact they could have on the team. Group members had the ability to express their emotions clearly.

Table 5.7: Group EI Characteristics of Group 4

| Group 4 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions, others' emotions and possible impact they could have on the team<br>• Group members had the ability to express their emotions clearly. | • N/A |
| **Self-regulation** | • Group members had the ability to regulate their emotions and their behaviours. | • N/A |
| **Motivation** | • Group was goal oriented, and each group member clearly understand their own tasks.<br>• Group members quickly engaged themselves into topic and work in their meetings, and everyone could complete their own work in advance.<br>• Group members felt comfortable and relaxed during the meeting. | • Group leader tended to arrange group meeting frequently before the deadline.<br>• There was rarely any communication between members if they did not have the deadline. |
| **Empathy** | • Group members could feel the support during discussion.<br>• Group members could listen to and understand others' ideas, and respected each other when they have different ideas.<br>• Group members respected different personalities, cultures, and backgrounds. | • N/A |
| **Social Skills** | • Group members communicated with their supervisor actively and appropriately in a timely manner.<br>• They communicated with other groups. | • N/A |

### Group Self-regulation

Group members had the ability to control their emotions and their behaviours so that they didn't have a negative impact on the project.

### Motivation

The group was goal oriented, and each group member clearly understood their own tasks. Despite sometimes not finishing their own work before the meeting, they tried to analysis the reasons and reduce the negative influence on the progression of the project. All of them could quickly participate in the discussion. Everyone wanted to make a contribution to the project. Thus, group members felt comfortable and relaxed in the meetings.

### Empathy

Group members felt supported when they discussed problems. Group members could carefully listen to others' ideas, and respect everyone, even if they had different ideas. Group members respected different personalities, cultures and backgrounds.

### Social Skills

Group members communicated with their supervisor actively and on time, and communicated with other groups to share experiences. They often organised social actives to promote their relationships.

### Group performance

The group performance characteristics of Group 4 are summarised in Table 5.8. The average mark (74) was similar to the group mark (75) and the average mark was higher than Group 1, Group 2 and Group 3. Standard deviation (S.D.= 3, range from 72 to 79) of individual marks was the same as Group 3. This means that the academic skill between group members in Group 4 is similar, but the overall academic skill of Group 4 is higher than Group 3. They spent a total of 200 hours on

Table 5.8: Group performance characteristics of Group 4

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 75 | 74 | 3 | 200 hours | 135 hours | 88% | 80% |

the project work, and 135 hours was effective time. Group 4 were able to meet all the department's deadlines, but missed a few internal deadline set by themselves. 80% of group members felt it was a pleasant cooperation for this year's project.

### 5.1.5 Case Study 5

Group 5 was composed of 3 males and 3 females with a mean age of 23.17 (S.D =0.37) (range from 23 to 24). The age range is much smaller than the above groups. All of them came from one country and they had a similar cultural background. By observing and analysing this group's meeting notes and videos, the Group EI characteristics of this group are summarised in Table 5.9. In comparison to Group 4, Group 5 is a team with some high Group EI characteristics but also some low Group EI characteristics.

#### Leader's EI characteristics

The group leader was a 23-year-old female student. She arranged group meetings to schedule and notified everyone in advance. Before each meeting, she searched for information about their project using self-learning. She tried to encourage her group members to share their ideas and emotions in discussion, and she was able to present her ideas and emotions clearly. Moreover, when group members presented their ideas and feelings, she listened to them carefully. However, the leader was not good at solving problems and conflicts between group members. If group members had arguments during the meeting, she often felt nervous and did not know how to deal with the disagreements. She said she feared conflict between group members. She tried to arrange each member's work properly, so that they could carry out the project with smooth progress, but the effect was weak. She wished to promote a positive working relationship between group members to finish their work. In fact, the group leader undertook the majority of the group work by herself. Most group members agreed that she was a hard-working leader.

Table 5.9: Group EI Characteristics of Group 5

| Group 5 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions, others' emotions and possible impact they could have on the group.<br>• Group members had the ability to express their emotions clearly. | • Group leader was aware of others' emotions. However, group leader did not know how to deal with others' emotions.<br>• Group leader was unable to express his own emotions and ideas clearly. |
| **Self-regulation** | • Group members had the ability to regulate their emotions.<br>• Group tried to facilitate a healthy environment to improve their relationships. | • Group leader was unable to facilitate the smooth progress of the project.<br>• Group members were unable to regulate their behaviours even if they knew some behaviours could have the negative impact on the project. |
| **Motivation** | • Group leader set the meeting agenda and notified everyone in advance.<br>• Group members felt comfortable and relaxed in the meeting. | • Most group members did not clearly understand their project and their own tasks.<br>• Group members lost motivations, 1/3 of group members were unable to attend their group meetings on time.<br>• Group members started their works and topic slowly after the meeting started.<br>• Except group leader, group members were unable to finish their own work before the meeting.<br>• Group leader could not engage group members to finish their work on time.<br>• In most situations, group members were overly relied on group leader. |
| **Empathy** | • Group respected different personalities, cultures and backgrounds. | • Group leader did not know how to balance different ideas.<br>• Group leader did not know how to deal with others' emotions when problems occurred.<br>• Group did not consider everybody's needs and feelings when they assigned the task. |
| **Social Skills** | • Group communicated with their supervisor actively and appropriately in a timely manner. | • When problems occurred, members were unable to communicate with each other appropriately in a timely manner. |

**Group Self-awareness**

Group members were aware of their own emotions, others' emotions and the possible impact they could have on the team. Group members had the ability to express their emotions clearly. However, group members lacked responsibility for their work. When problems occurred, they often thought it was not their responsibility first.

**Group Self-regulation**

Most group members had the ability to regulate their emotions. Sometimes, group members were unable to regulate their behaviours, even if they knew some behaviours had a negative impact on the project.

**Motivation**

Most group members were less motivated as they did not have a clear view of their project and the tasks they were assigned to. Despite group members taking an active part in discussions and sharing their ideas, work efficiency was low. Most of them did not want to work hard and wished the group leader could help them to do more work. This was also reflected in group members being unable to finish their own work before the meeting excluding the group leader. Thus, in most situations, the group members overly relied on the group leader and lacked motivation for self-study. The group were unable to focus on their work as they were used to being lazy.

**Empathy**

All group members came from one country, there was nearly no difference in cultural background. They respected different personalities.

**Social Skills**

The group leader communicated with their supervisor actively and timely, and communicated with other groups. When problems occurred, group members were un-

Table 5.10: Group performance characteristics of Group 5

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 48 | 56 | 4 | 480 hours | 240 hours | 50% | 60% |

able to communicate with others in a timely way, as they were used to depending on others to solve their problems.

#### Group performance

The group performance characteristics of Group 5 are summarised in Table 5.10. The group mark (48) is lower than the average mark (56). Although Standard deviation (S.D.= 4, range from 51 to 65) of individual marks is the same as Group 1, the average level of individual marks is much lower than Group 1's. They spent 480 hours in total on the project work, and 240 hours was effective time. At the same time, Group 5 were able to submit their work before all the department's deadlines, but they missed most of the internal deadlines set by themselves. This also revealed group members were lacking in motivation. 60% of group members felt they were part of the group, and enjoyed their group work.

### 5.1.6 Case Study 6

Group 6 was composed of 2 males and 4 females with a mean age of 24 (S.D= 0.89) (range from 23 to 25). They came from three different countries, four of them coming from one country. From observing and analysing this group's meeting notes and videos, the Group EI characteristics of this group are summarised in Table 5.11. Compared with the above groups, Group 6 is a team with half high Group EI characteristics, and half low Group EI characteristics.

#### Leader's EI characteristics

The group leader in Group 6 was a 24-year-old male student. The group leader arranged group meetings to schedule and notified everyone on time. He reviewed a lot of literature in advance and made preparations for the project before each meeting. He was aware of his own emotions and clearly express emotions in discussions. The leader tried to facilitate the smooth progress of the project, and

Table 5.11: Group EI Characteristics of Group 6

| Group 6 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • 2/3 group members were aware of their own emotions. However, they felt difficult to express their feelings and emotions in the group.<br>• Group leader was aware of others' emotions. However, she did not know how to deal with others' emotions. | • 1/3 Group members seemed unaware of their own emotions, others' emotions and possible impact they could have on the group<br>• 2/3 group members did not have the ability to express their emotions clearly.<br>• When problems occurred, group members tended to take it personally. |
| **Self-regulation** | • 2/3 group members had the ability to regulate their emotions and behaviours.<br>• Group leader tried to facilitate the smooth progress of the project | • One group member was unable to control her behaviour. He communicated with others emotionally and personally.<br>• Group leader was aware of problems. However, he was unable to balance relationships between group members. |
| **Motivation** | • Some group members focused on their project. Most of them clearly understand their own tasks.<br>• Group leader set the meeting agenda and notified everyone in advance. | • 1/3 group members lost motivations, one group member was always late their group meetings.<br>• Group members started their works and topic slowly after the meeting started, and 1/3 of group members were unable to finish their own work before each meeting.<br>• Group leader could not engage group members to finish their work on time.<br>• Group members were unable to create a relaxed environment. They did not feel free to express and contribute their ideas.<br>• In most situations, group members were overly relied on group leader. |
| **Empathy** | • Group respected different cultures and backgrounds.<br>• 2/3 group members could carefully listen to others' ideas, and respect others even if they have different ideas. | • 1/3 of group members thought their ideas were indubitable.<br>• One group member only focused on her own emotions and feelings. She never realised the problem or tried to understand the reason when others did not satisfy with her. |
| **Social Skills** | • Group communicated with their supervisor actively and appropriately in a timely manner.<br>• Three of them often socialised together as they cam from same country. | • Lack communication with other groups. |

to solve problems. He wished everyone could make their best contribution to the project. However, he was not good at balancing different people's requirements. The leader did not prepare a counter plan in order to avoid group members missing deadlines, although he knew some members could not finish their work every time. He respected different cultures and personalities of group members. On the whole, all the group members agreed that their leader was a friendly and hard working leader. One 25-year-old female student said :

> *I agree that he is a hard working and enthusiastic leader. He is friendly to everybody. However, he cannot arrange our work properly. I finish my own work every time, but I have to wait other people who didn't finish work for a long time during the meeting. This reduces our working efficiency.*

Another 23-year-old female student commented that project management is very important for the group leader:

> *I often felt our meetings wasted a lot of time. He paid more attention to the people who cannot finish the work, but ignored other people's feelings. It's important for group leader to improve his ability of project management*

**Group Self-awareness**

Most group members were aware of their own emotions and their possible impact on the group work. However, there was one female group member (B) who overly expressed her own emotions and ignored others' emotions. She was unaware of the possible influence of her negative emotions and behaviour on other members. This resulted in other members feeling it was difficult to express their emotions in the group. Most group members complained:

> *Why did she ask us to take care her emotions and feelings?*
> *We respect her feelings, but she didn't realise that respect is mutual.*

**Group Self-regulation**

Most group members had the ability to control their emotions and their behaviours. At the same time, most of them thought student B was unable to control her emotions and behaviour. She could not accept any mistakes made by others, but she did not allow other members to point out her problems if she made any mistake. For example, she became very angry if any member was late to group meetings, and argued with other members directly. But she did not make an apology if she was late to the group meeting and did not accept any reminders from other group members.

**Motivation**

Most group members focused on the project, and clearly understood what their tasks were. Student B lacked motivation and self-learning ability. She was often late to the group meetings without notification in advance. In this situation, the group leader was unable to make a decision to ensure the group meeting ran smoothly and efficiently. Meanwhile, the leader ignored others' feelings, so that other group members felt it was unfair and a waste of time. During the meeting, most exchanges between student B and the group leader were similar to the following:

Leader:*B, how about you are responsible for writing introduction part of final report?*
A:*I don't know what software to use to write the report.*
Leader:*Word will be fine.*
A:*I don't have Word software.*
Leader:*You can download it from our university website, it's free.*
A:*I don't know how to download.*

Obviously, one uncooperative and unmotivated group member had a significantly negative impact on other members' motivations and work efficiency. Group 6 were

Table 5.12: Group performance characteristics of Group 6

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 58 | 68 | 8 | 300 hours | 180 hours | 40% | 80% |

unable to create a relaxed environment in order to encourage all members to make their best contributions to the project.

**Empathy**

The group respected different cultures and backgrounds. Most group members could carefully listen to others' ideas, and respect everyone, even if they had disagreements. Only one group member thought her ideas should not be questioned. Student B communicated with others in an emotional and egotistical way. It was difficult for her to realise that she had communication and social problems. The group leader was aware of problems and conflicts; however, he was not good at solving problems. Therefore, the group members tended to work alone in some situations.

**Social Skills**

The group communicated with their supervisor actively and on time. However, they lacked communication with other groups, and they were unaware of the communication problem within group.

**Group performance**

The group performance characteristics of Group 6 are summarised in Table 5.12. The group mark (58) was much lower than the average mark (68), and Standard deviation (S.D.= 8, range from 58 to 77) is large. This reveals that the variation of individual project marks is large. They spent 300 total hours on project work, and 180 hours were effective time. Group 6 were able to finish all work before the department's deadlines, but missed most of the internal deadlines set by themselves. This also revealed that group members lacked in motivation. Only 40% of group members felt they were part of the group, and enjoyed their group work.

### 5.1.7 Case Study 7

Group 7 was composed of 1 male and 6 females with a mean age of 22.83 (S.D =1.95) (range from 21 to 27). They came from two different countries, with five of them from one country. From observing and analysing this group's meeting notes and videos, the Group EI characteristics of this group are summarised in Table 5.13. Compared with the above groups, Group 7 is a team with a large amount of low Group EI characteristics.

**Leader's EI characteristics**

During the beginning phase of the project, none of the group members wanted to take responsibility for being group leader. As it was necessary to elect a group leader for each group according to the project requirements, a 27-year-old female student in this group was nominated, based on the other members' votes. Consequently, she became the group leader, despite not being willing to take this responsibility. Due to this issue, Group 7 lacked motivation in both internal and external factors from the beginning of the project.

The group leader did not arrange group meetings with a suitable schedule, and did not notify everyone on time. She never tried to encourage group members to focus on the project and facilitate the smooth progression of the project. In most situations, the leader paid more attention to her own work and ignored other members, no matter whether it was others' ideas or feelings. She was unaware of the positive influence of a healthy relationship between group members.

**Group Self-awareness**

Group members were aware of their own emotions, and ignored others' emotions in most situations. They did not realise the possible impact of their emotions on the group work. Group members were less willing to share their ideas and feelings. When problems occurred, group members tended to take it personally.

Table 5.13: Group EI Characteristics of Group 7

| Group 7 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • 1/3 of group members were aware of their own emotions and others' emotions | • 2/3 of group members seemed unaware of others' emotions and possible impact they could have on the group.<br>• Some group members did not have the ability to express their emotions clearly.<br>• When problems occurred, group members tended to take it personally.<br>• Some group members did not have the ability to introspect. When problems occurred, they thought it was not their own responsibilities firstly. |
| **Self-regulation** | • 1/3 of group members had the ability to regulate their emotions. | • Some group members were unable to regulate their emotions well. They were overly emotional and personal in communication.<br>• Group leader was unable to facilitate the smooth progress of the project.<br>• Some group members were easier to be upset, and they did not realise they had upset peers. |
| **Motivation** | • 1/3 group members focused on their project. | • Nobody was willing to be group leader and take leader's responsibility.<br>• Group leader could not set the meeting agenda and notify everyone in advance.<br>• Most group members did not clearly understand their project and their own tasks.<br>• Group members lost motivations. Most of them often late to each meeting without any notification, even when they were having the meeting with their supervisor.<br>• Group members started their works and topic slowly after the meeting started, and most of them were unable to finish their own work before the meeting.<br>• Group members were unable to create a relaxed environment. All members did not feel free to express and contribute their ideas.<br>• In most situations, members tended to work personally.<br>• Members felt uncomfortable and depressive during the meeting. |
| **Empathy** | • Group respected different cultures and backgrounds. | • 2/3 of group members only focused on their own emotions and feelings.<br>• Group was unable to accept suggestions, even if the suggestion was given by their supervisor.<br>• 2/3 group members seemed unaware of they were parts of one group. |
| **Social Skills** | • N/A | • Group never communicated with their supervisor actively and appropriately in a timely manner.<br>• Lack of communication with other groups, and they were unaware of communication problems. |

**Group Self-regulation**

Most group members were unable to appropriately control their emotions. During group meeting, some group members often felt upset due to the complicated work. They expressed anxiety directly during the meetings and did not realise they had upset their peers. Group members were overly emotional and personal in communication.

**Motivation**

Group members did not focus on their group project, and most group members did not understand their project or their own tasks clearly. The group lost motivation and most of them were always late to every group meeting, without any notification, even if they had a meeting with the supervisor. For one group meeting with their supervisor, three students were absent, even with notification two week before. The group started their work and topic slowly during group meetings, and most group members were unable to finish their own work before the meeting. This resulted in them needing to take a long time to finish their own work during group meetings.

**Empathy**

The group respected different cultures and backgrounds. However, most group members only focused on their own feelings and emotions, and they seemed unaware that they were part of a group. The group was unable to accept suggestions, even if the suggestion was from their supervisor. Overall, Group 7 was unable to create a relaxed environment to encourage all members to speak their ideas freely and make a contribution. Group members felt uncomfortable, depressed, and tended to work on their own.

**Social Skills**

The group did not communicate with their supervisor actively and on time and they lacked communication between group members and with other groups. Although there were five students from one county with the same language and cultural background, they never socialised together in the one year study.

Table 5.14: Group performance characteristics of Group 7

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 55 | 63 | 3 | 900 hours | 120 hours | 30% | 20% |

#### Group performance

The group performance characteristics of Group 7 are summarised in Table 5.14. The group mark (55) is lower than the average mark (63), and the standard deviation (range from 60 to 65) is three. This reveals the variation of individual average course marks is small. They spent 900 total hours on the project work, and only 120 hours was effective time. Group 7 were able to complete work before all the department's deadlines, but missed most of the internal deadline set by themselves. This also reveals the group members' lack of motivation. Only 20% of group members enjoyed the one year group work and were satisfied with the group outcome.

### 5.1.8 Case Study 8

Group 8 was composed of 3 males and 3 females with a mean age of 23.83 years (S.D =1.07) (range from 22 to 25). All of them came from one country with the same language and cultural background. From observing and analysing the group meeting notes and videos, the Group EI characteristics of this group are summarised in Table 5.15.

#### Leader's EI characteristics

The group leader was a 25-year-old female student. She was a hard working leader. The leader was unable to arrange group meeting to a schedule and notify everyone in advance sometimes, so that she could not communicate with group members on time if any problems occurred. The leader had an ability to recognise her own emotions and others' emotions. However, she was not good at dealing with group members' emotions. She paid much more attention to project outcomes and believed that the result was more important than the process. Consequently, facilitating a relaxed and healthy environment was neglected by the group leader.

Table 5.15: Group EI Characteristics of Group 8

| Group 8 | Functional EI Characteristics | Dysfunctional EI Characteristics |
|---|---|---|
| **Self-awareness** | • Group members were aware of their own emotions, others' emotions and possible impact they could have on the group.<br>• Some members have the ability to express their emotions clearly. | • In most situations, group leader did not communicate with members in time so that he often ignored some members' emotions and ideas. |
| **Self-regulation** | • Group members had the ability to regulate their emotions and behaviours so that they did not have the negative impact on the project. | • N/A. |
| **Motivation** | • Group was goal oriented, and 2/3 of group members focused on their project.<br>• Group members quickly engaged themselves into topic and work in their meetings.<br>• Group members felt comfortable and relaxed in the meeting. | • Group leader was unable to set the meeting agenda and notified everyone in advance.<br>• 1/3 of group members lost motivations, and sometimes they were unable to attend their group meetings on time.<br>• In some situations, some group members tended to work personally.<br>• 1/3 of group members were unable to finish their own work before the meeting.<br>• Group leader could not engage group members to finish their work on time. |
| **Empathy** | • Group members respected different personalities, cultures and backgrounds.<br>• Group members could carefully listen to others' ideas, and respect each other even if they have different ideas. | • N/A. |
| **Social Skills** | • Group communicated with their supervisor actively and appropriately in a timely manner. | • When problems occurred, members were unable to communicate with each other appropriately in a timely manner. |

**Group Self-awareness**

Group members were aware of their own emotions, others' emotions and the possible impact they could have on the team. Most of them had the ability to express their emotions clearly.

**Group Self-regulation**

Group members had the ability to control their emotions in order to avoid them having any negative impact on other members' feelings and group work.

**Motivation**

The group was goal oriented, and most group members focused on the project. When they experienced some blocking issues or problems during their work, two scenarios were observed. In the first scenario, the workers actively sought help from other parties (e.g other students, supervisors or lecturers). Whereas, in the second scenario, students passively waited for help from others, no matter if it was from their supervisor or a group mate. In most situations, Group 8 could participate actively in discussions. Some members were often late to group meetings, and unable to finish their own works before the meetings. In some situations, most group members tended to work on their own.

**Empathy**

Group members could carefully listen to others' ideas, and respect everyone, even if they had different ideas. Group members respected different cultures, personalities and backgrounds. Most of them felt comfortable and relaxed during the meetings.

**Social Skills**

Group members communicated with their supervisor actively and on time. When problems occurred, group members were unable to communicate with others in a timely manner.

Table 5.16: Group performance characteristics of Group 8

| Group Mark | Average Mark | S.D. | Total Time | Effective time | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|
| 63 | 63 | 11 | 150 hours | 120 hours | 70% | 90% |

**Group performance**

The group performance characteristics of Group 8 are summarised in Table 5.16. The average individual project mark (63) is the same as the group mark (63). Standard deviation (S.D.= 11, range from 47 to 71) of individual project marks is the largest compared to the other 7 groups. They spent a total of 150 hours on project work, and 120 hours were effective time. Group 8 were able to finish their works before 70% of deadlines. 90% of group members felt comfortable and relaxed during the group work.

### 5.1.9 A Summary of Group Performance of the 8 Groups

The previous sections (from section 5.1.1 to 5.1.8) presented the findings of the case study carried out with 8 groups. Qualitative data related to the Group EI characteristics of each group and the group performance of each group were shown in detail. According to equations (from equation 4.1 to 4.5) in Section 4.3.1, quantitative data related to the groups' performance is also extracted from the case study in Table 5.17.

Table 5.17: A Summary of Each Group's Performance

| Group No. | Average Individual Mark | Group Mark (Quality) | Effectiveness | Efficiency | Productivity | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|---|
| 1 | 64 | 70 | 0.99 | 0.7 | 0.7 | 0.95 | 1 |
| 2 | 65 | 65 | 0.31 | 0.59 | 0.18 | 0.5 | 0.2 |
| 3 | 66 | 68 | 0.63 | 0.68 | 0.43 | 0.6 | 0.8 |
| 4 | 74 | 75 | 0.68 | 0.55 | 0.38 | 0.88 | 0.8 |
| 5 | 56 | 48 | 0.44 | 0.2 | 0.18 | 0.5 | 0.6 |
| 6 | 68 | 58 | 0.6 | 0.32 | 0.19 | 0.4 | 0.8 |
| 7 | 63 | 55 | 0.13 | 0.45 | 0.06 | 0.3 | 0.2 |
| 8 | 63 | 63 | 0.8 | 0.53 | 0.42 | 0.7 | 0.9 |

The results reveals that Group 4 was the group with the highest outcomes, for both average mark and group marks. Their average mark (AM= 74) is nearly the same as the group mark (GM= 75). The group mark of Group 1 is slightly lower than

that of Group 4 (GM= 70), and this was the group with the highest effectiveness (0.7), efficiency (0.99), productivity (0.7), timeliness (0.95) and satisfaction (100%) results. The group outcomes for Group 2, Group 3 and Group 8 are similar around 63 to 68, and their average marks are similar to their group marks. The group marks of Group 5, Group 6 and Group 7 are much lower than their average marks. In addition, Group 5 is the group with lowest outcomes in the average marks (AM= 56), group mark (GM= 48), effectiveness (0.44), and productively (0.18). The efficiency (0.13), productively (0.06), timeliness (0.3) and satisfaction (0.2) of Group 7 are the lowest compared to the other 7 groups.

## 5.2 Findings from Questionnaire Survey

This section presents the main results and findings from the questionnaire survey. The survey was completed by 70 Masters students enrolled on the Engineering Management (EM) MSc at the University of York. The findings of the questionnaire survey is a way to examine the individual EI levels in the groups, and the proportion of influence of each group member on the group work. This research focuses on group work, and each group is a unit of research data sample. According to the consent agreement and ethical approval, if any member of a group wanted to withdraw from the research study, the data from the whole group became invalid. Thus, the final valid data of the research was 48 students in 8 project groups. This involved 26 females and 22 males with a mean age of 23.9 years (S.D.=2.07) (range from 22 to 31). The overview of the collected data is demonstrated in Table 5.18. The quantitative data were analysed using Excel 2016 for descriptive and inferential statistics. The results are presented in the form of tabulations and figures.

### 5.2.1 EI changes

As was alluded to in Chapter 4, the first task of the questionnaire survey in this research was to examine individual EI as a group member for the 8 groups, and possible fluctuations caused by the duration of a group being together (section 4.3.1). Thus, individual EI as a group member was measured twice. The first time the individual EI was measured was at the beginning of the project. The second time the

Table 5.18: Overall measured data for each group and each member. The number in first row refers to which member this column is representing and the number in the first column refers to which group this row is representing

| Group No. | | Leader | Member 1 | Member 2 | Member 3 | Member 4 | Member 5 |
|---|---|---|---|---|---|---|---|
| 1 | $1^{st}$EI | 102 | 88 | 49 | 84 | 78 | 91 |
| | $2^{nd}$EI | 102 | 85 | 70 | 84 | 72 | 89 |
| | IM[1] | 57 | 61 | 62 | 67 | 68 | 69 |
| | W[2] | 0.16 | 0.14 | 0.14 | 0.13 | 0.12 | 0.13 |
| 2 | $1^{st}$EI | 80 | 74 | 89 | 96 | 80 | 55 |
| | $2^{nd}$EI | 78 | 70 | 85 | 92 | 75 | 45 |
| | IM[1] | 52 | 63 | 58 | 80 | 68 | 68 |
| | W[2] | 0.13 | 0.16 | 0.11 | 0.15 | 0.13 | 0.06 |
| 3 | $1^{st}$EI | 88 | 93 | 89 | 82 | 73 | 90 |
| | $2^{nd}$EI | 89 | 91 | 90 | 80 | 75 | 90 |
| | IM[1] | 68 | 70 | 68 | 63 | 62 | 64 |
| | W[2] | 0.15 | 0.14 | 0.13 | 0.12 | 0.13 | 0.12 |
| 4 | $1^{st}$EI | 93 | 65 | 71 | 84 | 71 | 71 |
| | $2^{nd}$EI | 95 | 70 | 70 | 88 | 75 | 72 |
| | IM[1] | 79 | 72 | 72 | 77 | 72 | 72 |
| | W[2] | 0.15 | 0.16 | 0.14 | 0.15 | 0.16 | 0.14 |
| 5 | $1^{st}$EI | 62 | 56 | 73 | 67 | 81 | 64 |
| | $2^{nd}$EI | 60 | 62 | 71 | 65 | 81 | 61 |
| | IM[1] | 65 | 56 | 53 | 55 | 55 | 51 |
| | W[2] | 0.15 | 0.13 | 0.09 | 0.12 | 0.09 | 0.13 |
| 6 | $1^{st}$EI | 71 | 45 | 73 | 80 | 79 | - |
| | $2^{nd}$EI | 65 | 45 | 72 | 80 | 75 | - |
| | IM[1] | 77 | 61 | 58 | 77 | 63 | - |
| | W[2] | 0.16 | 0.12 | 0.11 | 0.12 | 0.09 | - |
| 7 | $1^{st}$EI | 77 | 76 | 79 | 45 | 50 | 40 |
| | $2^{nd}$EI | 75 | 72 | 80 | 42 | 51 | 40 |
| | IM[1] | 60 | 60 | 65 | 60 | 66 | 65 |
| | W[2] | 0.14 | 0.10 | 0.14 | 0.13 | 0.14 | 0.06 |
| 8 | $1^{st}$EI | 87 | 88 | 106 | 88 | 65 | 45 |
| | $2^{nd}$EI | 85 | 85 | 102 | 86 | 68 | 51 |
| | IM[1] | 73 | 47 | 74 | 73 | 62 | 52 |
| | W[2] | 0.16 | 0.13 | 0.15 | 0.14 | 0.15 | 0.14 |

[1] Individual Mark

[2] Weight Coefficient

Table 5.19: The difference between two EI tests

| | **Mean** | **S.D** | $p-value$ |
|---|---|---|---|
| $1^{st}$ EI test | 75.17 | 15.61 | 0.20 |
| $2^{nd}$ EI test | 74.60 | 14.86 | |

individual EI was measured was after the participants finished their project. The results revealed that individual EI scores as a group member generally declined over the period of the project term. The overall average EI score went down from an average score of 75.17 (S.D.= 15.61) to 74.60 (S.D.= 14.86), or a loss of 0.58 points.

To determine whether the decrease in overall EI scores over the period of the project was statistically significant, a T-test was applied (see Table 5.19). The result revealed that no statistically significant difference was found between the two EI tests for the entire sample.

### 5.2.2 EI and Gender

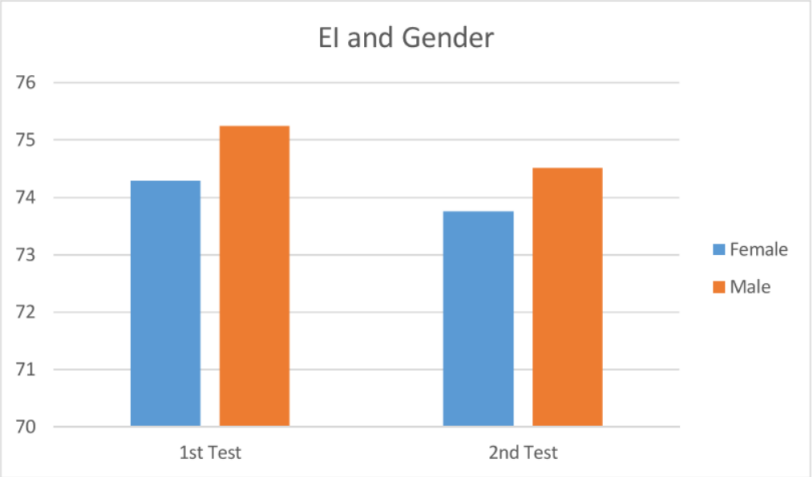
Exploratory analysis was conducted to determine whether demographic factors, such as gender, were a significant contributor to the difference between the first and second EI test scores. Table 5.20 displays the Mean, Standard Deviation and individual EI changes for gender over the test-retest period.

Table 5.20: Average EI score and EI differences for gender over the test and re-test period.

| | **Female** | | **Male** | | **EI Difference** | $p-value$ |
|---|---|---|---|---|---|---|
| | Mean | S.D | Mean | S.D | Mean(M)- Mean(F) | |
| $1^{st}$ EI test | 74.27 | 15.30 | 75.24 | 14.53 | 0.97 | 0.39 |
| $2^{nd}$ EI test | 73.76 | 15.13 | 74.51 | 14.61 | 0.75 | 0.40 |

The results revealed that no significant EI difference was found between female students and male students for the scores taken in two EI measurements. However, males generally scored higher than females in both EI measurements, but only by a small margin. Figure 5.1) demonstrates that both female EI and male EI slightly decreased after an academic year, and the variance was almost the same. The

Figure 5.1: EI and Gender




overall EI mean scores of female students between the EI first test and second test were 74.29 (S.D.=15.30) and 73.76 (S.D.=14.53), respectively, or a loss of 0.53 points. In addition, the overall EI mean scores of male students between the EI first test and second test were 75.24 (S.D.=15.13) and 74.51 (S.D.=14.61), respectively, a loss of 0.73 points.

Table 5.21 presents the difference between males and females on four dimensions of WEIP-S. The results shows that males scored marginally higher than females on awareness of own emotions, management of own emotions, and management of other's emotions. The average score of males on awareness of other's emotions is nearly same with the average score of females. Moreover, the average scores of both of males and female on management of own emotions are obviously higher than their other three dimensions, respectively. This result implies that both of males and females understand that managing their own emotions is important in the teamwork.

Table 5.21: The Difference between Males and Females on Four Dimensions of WEIP-S

| **WEIP-S Dimensions** | **Female** | **Male** | $p-value$ |
|---|---|---|---|
| Awareness of own emotions | 19.28 | 19.23 | 0.12 |
| Management of own emotions | 21.60 | 21.67 | 0.38 |
| Awareness of other's emotions | 18.38 | 18.37 | 0.14 |
| Management of other's emotions | 19.25 | 19.28 | 0.19 |

### 5.2.3 The Weight Coefficient of Each Group Member

As was alluded to in Chapter 4, the second task of Phase 2 in this research was to examine the weight coefficient of each group member on Group EI (section 4.3.2). 360-degree assessment results are used to display the weight coefficient of each group member within a group (see Table 5.18).

The weighted coefficient of each group member in Group 1 is similar, the difference of each group member's weight is small. At the same time, the group leader's weighted coefficient is the largest compared to other members. This means the group leader played an important role in Group EI, and the influence of every group member was equally important. All group members tried to make a contribution to Group EI and group establishment.

The circumstances of Group 3 and Group 8 are similar to Group 1. All weighted coefficients of Group 4 are slightly higher than Group 1. Whereas, Group 2 has contrasting circumstances.

For Group 2, one group members' weighted coefficient $(0.06)$ was much lower than the other five members'. In addition, one group member's weighted coefficient $(0.16)$ was higher than the group leader's $(0.13)$. This means all group members agreed that the group leader's role in contributing to Group EI was less than other group members.

The situations for Group 5, Group 6 and Group 7 are similar, the weighted coefficients of the group leaders were the largest compared to other group members. One or two members' weighted coefficients are much lower than the others. This means there was an obvious gap in the influence of all group members on Group EI.

The influence of group members in a group is useful for the Discussion chapter. It can be used to determine the new Group EI and case study analysis.

Table 5.22: A summary of Group EI for 8 groups.

| Group No. | Average GEI | New GEI |
|---|---|---|
| 1 | 82.00 | 67.37 |
| 2 | 79.00 | 57.98 |
| 3 | 85.83 | 68.53 |
| 4 | 75.83 | 68.06 |
| 5 | 67.17 | 47.65 |
| 6 | 69.60 | 49.23 |
| 7 | 61.16 | 47.70 |
| 8 | 79.83 | 65.12 |
| Correlation between Average GEI and New GEI $= 0.89$ | | |

### 5.2.4 Group EI

Following the results of Sections 5.2.1 to 5.2.3, the Group EI results of the 8 groups are shown in Table 5.22. Average GEI is Group EI using the average values of individual EI, whereas the new GEI is the Group EI measurements using the method proposed in this research. At the bottom of this table, the correlation between the two measurements of Group EI is shown.

From this table, it can be seen that the Group EI measured by two measurement approaches are different. The proposed measurement approach, in general, has a lower measured value compared to the existing Group EI measurement approach. However, the correlation between the measurements using the two approaches is relatively high ($r(8) = 0.89, p < 0.001$). In addition, it can be seen from the table that the group (Group 3) with the highest measured Group EI using the existing approach have the same highest Group EI if the proposed measurement approach is used. However, the group with the lowest Group EI (Group 7) when using the existing approach is not the group with the lowest Group EI (Group 5) if the proposed measurement approach is used. To understand such difference as well as to investigate which measurement approach is more representative, the Group EI measurement result itself is not enough. It is necessary to have information or data from other perspective so that it can be better understand. Thus, this result will be discussed in Section 5.3, which combines with the analysis of case study.

### 5.2.5 Individual EI and Individual Performance

Table 5.23 demonstrates the statistical analysis results between individual EI and individual performance. It can be seen that the correlation between individual EI and individual mark is low ($r(48) = 0.29$, $p < 0.001$). There is no difference between two test results. This result is similar to existing studies reviewed in section 2.5.4. The reason for this result is that the WEIP-S measures individual EI when people work as a group. During the work, people need to interact with others to deliver the final outcomes. Then, the individual performance is measured based on their contribution to the final outcomes. However, the individual performance in this research is measured by marking the outcome of a task that was completed independently. This task depends on the individual's academic knowledge and skill. It does not require any interaction between people to achieve the outcome. Thus, the measured individual performance is less correlated to the measured individual EI.

Table 5.23: The correlation between individual EI and individual performance.

| Individual EI | Individual Mark |
|---|---|
| $1^{st}$ EI test | 0.29 |
| $2^{nd}$ EI test | 0.29 |

*All $p$-value is smaller than 0.01 ($p < 0.001$).

### 5.2.6 Leader's EI, Group EI, and Group Performance

As previous studies reviewed in Section 2.2.4, the group leader's EI has a direct influence on group performance. Table 5.24 demonstrates the relationship between the group leader's EI and the Group EI. In the table, the correlation between the two leader's EI tests and the Group EI using the proposed approach (New GEI in the table) are higher than the correlation between the two leader's EI tests and Group EI using the existing approach (Average GEI in the table). Meanwhile, all correlations are positive. It can be concluded that the correlation between the second leader's EI test and the average GEI is not statistically significant, as the $p - value$ is larger than $0.05$ ($r(8) = 0.69$, $p = 0.07$). Whereas, the correlation between the two leader's EI tests and the new GEI is statistically significant as

all p-values are much less than $0.01$ ($r_1(8) = 0.88$, $p < 0.01$, and $r_2(8) = 0.90$, $p < 0.01$).

Table 5.24: The correlations between leader's EI and Group EI.

| | **Average GEI** | | **New GEI** | |
|---|---|---|---|---|
| | $r$ | $p-value$ | $r$ | $p-value$ |
| $1^{st}$ EI test | 0.69 | 0.03 | 0.88 | $< 0.01$ |
| $2^{nd}$ EI test | 0.69 | 0.07 | 0.90 | $< 0.01$ |

Table 5.25 shows the correlations between the two leader's EI tests and many group performance measurements, including average mark, quality, effectiveness, efficiency, productivity, timeliness, and satisfaction, which are significantly positive. It can be seen that the measured EI is highly correlated to the quality ($r_1(8) = 0.89$, $p < 0.01$, and $r_2(8) = 0.90$, $p < 0.01$), effectiveness ($r_1(8) = 0.82$, $p < 0.01$, and $r_2(8) = 0.85$, $p < 0.01$), and productivity ($r_1(8) = 0.83$, $p < 0.01$, and $r_2(8) = 0.82$, $p < 0.01$). For efficiency and timeliness, the results also show that they achieved more than $0.6$ correlation to the measured EI. The other performance measurements, also manage around $0.5$ correlation to the measured EI. This means the measured EI is correlated to all performance measurements. From the p-values, it can be concluded that the correlation between the measured EI and performance is statistically significant, as all p-values are much less than $0.01$.

### 5.2.7 Group EI and Group Performance

Table 5.26 demonstrates the relationship between Group EI and group performance. The table shows the correlation between group performance measurements and two Group EI measurements using the existing approach (Average GEI in the table) and the proposed approach (New GEI in the table). The new Group EI has high positive significant correlations with quality ($r(8) = 0.90$, $p < 0.05$), effectiveness ($r(8) = 0.85$, $p < 0.05$), efficiency ($r(8) = 0.68$, $p < 0.05$), productivity ($r(8) = 0.84$, $p < 0.05$), timeliness ($r(8) = 0.89$, $p < 0.05$), and satisfaction ($r(8) = 0.57$, $p < 0.05$). Moreover, the new Group EI has moderate positive significant correlations with average mark ($r(8) = 0.49$, $p < 0.05$). On the other hand, the average Group EI has high positive significant correlations with quality ($r(8) = 0.73$, $p < 0.05$), effectiveness ($r(8) = 0.80$, $p < 0.05$), efficiency

($r(8) = 0.63$, $p < 0.05$), productivity ($r(8) = 0.78$, $p < 0.05$), and timeliness ($r(8) = 0.72$, $p < 0.05$). It has moderate positive significant correlation with satisfaction ($r(8) = 0.47$, $p < 0.05$), and low significant correlation with average mark ($r(8) = 0.24$, $p < 0.05$).

Table 5.25: A summary of correlations between leader's EI and group performance.

| | Average Mark | Quality | Effectiveness | Efficiency | Productivity | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|---|
| $1^{st}$ EI test | 0.51 | 0.89 | 0.82 | 0.66 | 0.83 | 0.75 | 0.49 |
| $2^{nd}$ EI test | 0.50 | 0.90 | 0.85 | 0.63 | 0.82 | 0.76 | 0.46 |

*All *p* value is smaller than 0.01 ($p < 0.01$)

Table 5.26: A summary of correlations between Group EI and group performance.

| | Average Mark | Quality | Effectiveness | Efficiency | Productivity | Timeliness | Satisfaction |
|---|---|---|---|---|---|---|---|
| $1^{st}$ Average GEI | 0.24 | 0.73 | 0.80 | 0.63 | 0.78 | 0.72 | 0.47 |
| $2^{nd}$ New GEI | 0.49 | 0.90 | 0.85 | 0.68 | 0.84 | 0.89 | 0.57 |

*All *p* value is smaller than 0.05 ($p < 0.05$)

It can be seen that the proposed Group EI measurement approach achieves a higher correlation to various group performance measurements compared to the existing Group EI measurement approach. The biggest correlation improvement can be seen between Group EI and the average mark, which is $0.25$. For quality and timeliness, a $0.17$ increase in correlation is observed from the table. The smallest correlation improvement is effectiveness, which is $0.05$. Regarding the significance of these results, the p-values are all below $0.05$, which means all the results are statistically significant. This result supports the Hypothesis 2.

## 5.3 Discussion

As the results were presented in Sections 5.1 to Section 5.2), this section discusses the findings and results in the context of the literature and addresses the research objectives.

### 5.3.1 Average Group EI and New Group EI

Prior research on Group EI used the average of individual EI scores whereas this research proposed that *"the weighted average of individual EI scores as an indicator of the overall EI of a group based on different role's contributions to group work is more representative than the average of individual EI."*

For average GEI, the Group EI results of 8 groups in sequence from highest score to lowest score are Group 3, Group 1, Group 8, Group 2, Group 4, Group 6, Group 5, and Group 7. For new GEI, using the weighted average of individual EI scores, the results of 8 groups in sequence from highest score to lowest score are Group 3, Group 4, Group 1, Group 8, Group 2, Group 6, Group 7, and Group 5. From both results, Group 3 is the group with the highest EI score, and the Group EI of Group 1 is higher than Group 8. However, the difference between Group 2 and Group 4 is large.

As was alluded in the case study (see Sections 5.1.2), Group 2 were not behaving like a group, as no one felt they were part of one group. Some group members in

Group 2 seemed unable to control their emotions and behaviours. They lacked motivation and empathy. As a consequently, a large amount of negative emotions were brought into the group. This resulted in Group 2 being overly emotional and personal in communication. They were also not good at expressing their emotions and solving conflicts, which could be seen in them often feeling overwhelmed when they faced one member's aggressive attitude. Except for the issues with group members, the leader of Group 2 also failed in his responsibility. He was less sensitive to feeling his own emotions and those of his group members. He did not perform what a leader is supposed to do when the negative emotions were spread across the group. The same observation can also been seen from the weight coefficient calculated from 360 degree assessment questionnaire. As shown in Table 5.18, leader's weight coefficient is lower than some group members' weight coefficients, which indicates that the group leader did not behave as other members had expected. Also, the weight coefficient of group member 5 is much lower than other group members, which indicate that group member 5 is the one who brought the negative emotions to the group. On the other hand, Group 4 was a group with more high Group EI characteristics than Group 2 (as introduced in Section 5.1.4). The leader of Group 4 showed more characteristics of high EI than the leader of Group 2. At the same time, Group 4 were aware that facilitating a healthy and relaxed environment was beneficial for group relationships and good group work. Consequently, Group 4 were performing more like a team as they presented more high Group EI characteristics. The weight coefficient of each member of Group 4 (as shown in Table 5.18) does support the observation of the behaviour of Group 4 as each member, including leader, has similar weight coefficient.

In the similar circumstances of Group 5 and Group 7, Group 5 were more likely to be aware of their own emotions, others' emotions and the possible impact they could have on the team. The leader of Group 5 worked hard and tied her best to ensure project progress. For example, the leader often encouraged the group members to focus on the project, and summarised their work every once in a while as follows:

*"Our last report results were not ideal, we need to pay attention to our own work and focused on the project in the next term. I believe we can achieve a better results if we try our best."*

However, Group 7 tended to work individually as they did not realise that they needed to perform as a group. No group members were willing to take the responsibility of being leader. But they also did not support the leader's work. None of them tried to build a relationship with other group members. Their supervisor could not get a response from them on time when he wanted to communicate with Group 7. Subsequently, the supervisor often felt dissatisfied and worried about their project work. Therefore, Group 5 showed more characteristics of high EI than Group 7.

The 360-degree assessment which showed that every group member made the same contribution to Group EI and had a positive impact on Group EI and group work is an impossible result. Some group members even had a negative influence on other group members' emotions, which subsequently influenced Group EI and group work.

Through combining the analysis results of the case study and the questionnaire, it is not necessarily the case that a group with high individual EI has high Group EI when they work as a group or a team. From the case study results, it can be concluded that by introducing the weight coefficient of each group member on group work into the measurement of Group EI, Group EI will be more representative and more capable of understanding what happens during group work. The weighted average of individual EI scores considered the weight coefficient of the team member roles and the contributions of the group members to Group EI. Therefore, the weighted average of individual EI scores as an indicator of the overall EI of a group based on different role's contributions to group work is more representative than the average of individual EI. This section is used to answer research question 1.

### 5.3.2 Leader's EI, Group EI, and Group Performance

As reviewed in previous studies reviewed in Section 2.2.4, the group leader's EI has a direct influence on group performance. Dansereau et al., [90] suggest that leaders could influence their group members' performance through supporting their positive feelings. Section 5.2.6 reveals that leader's emotions could affect group members' emotions and substantially affect the members' attitude, behaviour and performance. Group leaders with high EI characteristics are more likely to understand their own emotions and group members' emotions. They also understand the possible impact of their emotions on group members' emotions, and the possible impact of the group's emotions on group performance. Meanwhile, group leaders are aware of the importance of building a healthy and relaxed environment, which is important and could improve relationships between group members and group work. This is demonstrated in case study 1 (Section 5.1.1) and case study 4 (Section 5.1.4). In particular, the emotional regulation of the group leader was found to help group members by proactively controlling their negative emotions or redirecting irrational or destructive behaviours stemming from negative emotions into constructive behaviour (section 5.1.1). One student expressed:

> *"Our group leader can understand our feelings and challenges we are facing. Because of such understanding, we are happy to work with him, and tell him what we think and how we feel during group work. As a result, we all believe that we can perform well even when the situation is challenging."*

Another student said:

> *"Our group leader tried to build positive relationships within group. For example, he often organized us to socialise together. It's easier for us to understand each other's personality. And then I can share my ideas and feelings as I can trust my team mates."*

One student in Group 1 also expressed that

> *"Our leader has an ability to be aware of our feelings and emotions, and respect our feelings. He can listen our ideas carefully and explain his opinions patiently even if we have disagreement."*

The findings are well supported by the literature suggesting that leaders influence their group members' performance by supporting their positive feelings. In addition, leaders with high EI are more sensitive to their own emotions and their followers' [91, 92, 93]. In contrast, case study 2 (Section 5.1.2) and case study 6 (Section 5.1.6) revealed that lack of awareness of one's own emotions and the group members' emotions resulted in a lack of trust and empathy during group work. For example, one student said:

> *"I have to admit that our group leader is hard working, but, sometimes we feel that it's hard to let him understand our feelings. He hardly realises that there are some problems between our relationships. Therefore, we find it's hard to communicate within a group."*

The group leader's ability to solve problems could influence group members' motivation (case study 5 in Section 5.1.5). In particular, case study 7 (Section 5.1.7) has shown that a lack of motivation from the group leader will lead to a lack of motivation for the entire group. On that lack of motivation, a student expressed:

> *"Our group leader nearly didn't communicate with us. She was also often late to the group meetings. So, I don't think we are one group, we often work individually."*

Thus, team leaders have a strong impact on their team members' feelings in terms of frustration and optimism, and subsequently, on performance. A group leader with high EI is able to improve group performance by managing their own emotions and having a positive influence on subordinates' emotions.

### 5.3.3 The Influence of Group EI on Group Performance

Previous research in other fields and sectors has shown that individuals with high EI scores perform better than those with low EI scores [25, 20, 17]. The findings

of this research also demonstrate that a group with higher Group EI characteristics was more likely to have high a group performance. These findings can be observed from both the qualitative results and the quantitative results.

From the case study results, group members in high Group EI groups are more likely to understand other group members' emotions. Consequently, the group will not only have a more relaxed and healthier working environment, but they will also have a closer relationship between group members, which all contributes to a better group performance. This can be seen in case study 1 (Section 5.1.1), case study 3 (Section 5.1.3) and case study 4 (Section 5.1.4).

By contrast, a lack of emotional awareness and emotional control prevented group members' having rational thoughts and caused impulsive and irrational behaviours, which impaired work performance. For example, case study 2 (Section 5.1.2) and case study 7 (Section 5.1.7) show that unregulated negative emotions resulted in students being distracted from work and concentrating on the negative emotions instead of solving the problems, hence preventing effective working and problem solving.

A group with strong motivation is more likely to achieve high group effectiveness, as group members are able to focus on the group work and try their best to contribute to group work. Group members were encouraged when they worked as a team. Moreover, a group with high Group EI characteristics often communicated in a timely manner when any problems occurred. By contrast, case study 7 (Section 5.1.7) revealed that the group members tended to work individually and lacked communication, this caused a reduction in group effectiveness and efficiency.

From the questionnaire results presented above, it can be summarised that Group EI has a significant positive impact on group performance. Group performance includes quality, effectiveness, efficiency, productivity, timeliness and satisfaction. At the same time, the correlations between new GEI using the proposed approach and group performance are higher than the correlations between average GEI using the existing approach. And the correlations are statistically significant. This one

aspect demonstrates that the relationship between the new GEI and group performance is more closely correlated than the relationship between average GEI and group performance.

As a result, a group with high Group EI characteristics is more likely to work as a group and achieve a high group performance. This discussion is used to answer research question 2.

### 5.3.4 Recommendations for Enhancing Group EI

The final objective of the research is *"to propose recommendations to enhance Group EI"*. The recommendations below comprise a selection of group members' comments and case study observations.

#### Introducing the concept of Group EI to team members

At the beginning of this research, a presentation was given to all participants to help them understand the concept of Group EI. Teams needed to be aware that a group member's emotional awareness and emotional regulation affects other members' emotions, behaviours, the group environment and subsequently affects Group EI and group performance. Some participants thought that as long as they had good academic ability, they would have a better outcome from the group work. By way of example, a student in case study 2 (Section 5.1.2) was unable to control his emotions and often expressed unpleasant emotions to other group members. He could not realise that he needed to control his emotions as a group member during group work. He did not know the impact of his negative emotions on the other group members. However, when someone tried to explain such matters to him, he refused to acknowledge the issue and insisted that his academic ability would bring the group to success.

Another participant in case study 6 (Section 5.1.6) also expressed this problem:

> *"why did student B always ask us to take care of her emotions and feelings? We can respect one person's feeling, but that person needs to realise that respect is mutual."*

Thus, the first suggestion is having the relevant training for team members in order for them to understand Group EI is an important part of the team work. Group members need to have the ability to understand their own and others' emotions, express emotions and regulate emotions.

The final objective of the research is *"to propose recommendations to enhance Group EI"*. The recommendations below comprise a selection of group members' comments and case study observations.

**Building closer relationships within the group**

Through the analysis of the data from the case study, the second recommendation is that it is of paramount importance to build a close relationship within a group. A group is composed of many different people with different backgrounds, beliefs and personalities. In addition, the personality of each person within a group will also be different. In order to maximise the outcome from the group, it is necessary for each group member to understand others' backgrounds, beliefs and personalities. To do this, building a closer relationship between group members is one simple and effective way. This also can be observed in case study 1 (Section 5.1.1) and case study 4 (Section 5.1.4).

Below is an opinion quoted from one of the participants. It directly reflects what he/she thinks about the importance of close relationships and its impact on group performance:

> *If we can establish a close relationship that would really help. When we work together, we understand each other's personality, cultural background and habits. We can feel team mates are our friends, we can relate more to them. That relationship really helps us to work more effectively.*

**Reasonable arrangement of team roles**

The final recommendation is to have a reasonable arrangement of team roles. The proposed Group EI measurement approach considers the factor of team roles and

contributions, with different roles requiring different behaviours and responsibilities. If group member is assigned a role that he/she is not comfortable with, it will significantly affect his/her ability to contribute to the group outcome. Therefore, it is important to have a reasonable arrangement of team roles. For example, before a group is organised, some procedure (e.g Belbin Team Roles Inventory [175]) can be used to assess each group member candidate. The outcome from such procedure can indicate the strength and weakness of each candidate as well as give suggestion of what is the suitable role for each candidate. Then, the group members can be chosen from the candidates and nominate the most suitable member to take each role in the group.

Such a recommendation is supported by the case study. Case study 7 (section 5.1.7) is a very good example. In that case study, the group leader was elected by other group members but she did not wish to take responsibility. However, as the other group members had agreed on this, she had no option to decline. As a consequence, she did not behave like a group leader which includes not organising group meeting actively, not assigning the group work to each group member, and so on. As a result, the group performance of this group was relatively low compared with other groups.

## 5.4 Summary

This chapter presents the findings and results from the three research phases of the current research, including a case study and a questionnaire survey of 8 groups. Section 5 summarised the main findings, and Section 5.3 discussed the results aligned with the objectives in relation to the extant literature. The investigation from objective one to objective six has been fully addressed and achieved in the current study. The results revealed that using the weighted averages of individual EI scores as an indicator of the overall EI of a group based on different role's contributions to the group work are more representative than the average of individual EI. The weighted average of individual EI scores considered the influence of group members' roles and the contributions of group members to building

Group EI during group work. In addition, the results clearly explained the influence of Group EI on group performance. Finally, this chapter presented some operable recommendations for enhancing Group EI in group work.

# Chapter 6

# CONCLUSION

It has not been long since the concept of EI was proposed. During this short period, EI has attracted considerable research to find a better measurement approach, and to explore its ability to correlate with other critical attributes which can be used to evaluate the success of a person's life. With the development of the social trend towards cooperation, the concept of EI has developed into the concept of Group EI. The author of this thesis is one of the researchers that believes in the influence of EI and Group EI on the world. At the beginning of this thesis, two research questions were proposed. To conclude this thesis, it is necessary to re-visit the two research questions, to decide whether they have been addressed.

The first research question was:

> **Research Question 1:** How can overall Group EI be more representatively measured compared to existing approaches?

In this thesis, a Group EI measurement approach was proposed which not only considers individual EI, but also considers the role of each group member and their contribution to the group outcome. To evaluate whether such a measurement approach is more representative than the existing approach, the author proposed a methodology that adopts both quantitative and qualitative research methods to

address this research question. Based on the methodology, a study was carried out on 8 project groups which were composed of Masters students from the Department of Electronics, University of York. The experiment lasted for the entire duration of the students' final project (6 months). Therefore, it is believed that the findings from this experiment are more realistic than other existing experiments, which temporarily organise groups of people, with each group being given a short task to perform.

The results show that the proposed Group EI measurement approach can achieve a better correlation to many group performance measurements than existing Group EI measurement approaches. Therefore, it is concluded that the proposed Group EI measurement approach is more representative than the existing approaches. Such a conclusion complies with the research hypothesis which is proposed for this research question.

The second research question is:

> **Research Question 2:** What is the influence of Group EI on group performance?

In this thesis, the data captured in the experiment is used to address this research question. First of all, the quantitative data analysis has shown that Group EI is correlated with various group performance measurements. Then, the qualitative data is used to further analyse and understand how Group EI can affect group performance. This analysis involves observing group behaviour during group work and quoting the participants describing how they feel in various situations. The results show that a group with higher Group EI will have better motivation within the group, a happier working environment and more trustworthy relationships between group members. All of which contribute to a better group performance.

## 6.1 Limitations

Through re-visiting the research questions in this thesis, it can be concluded that they have been addressed. However, there are also some limitations, which are

acknowledged below:

- **Participants -** As introduced before, all of the participants in this research were Masters students in the Department of Electronics, University of York. Therefore, although the results addressed the research questions, they only apply to university students, not people from other industries. As a result, it cannot be concluded that the proposed Group EI measurement approach is more representative than existing approaches under all conditions.

- **Role and Contribution Assessment -** The proposed Group EI measurement approach not only considers the individual EI of each group member, but also considers their role and contribution to the group. However, as the approach to comprehensively assess a group member's role and contributions to the group is outside the scope of this research, a 360 feedback questionnaire is used to perform this duty. Here, it is not saying that the 360 feedback questionnaire is not able to assess a group member's role and contributions to the group, but, as the proposed Group EI measurement approach takes this information into consideration, it can have significant impact on the Group EI measurement. So far in this thesis, this issue has yet to be addressed. Therefore, it is considered to be a limitation.

- **Group Composition -** In this research, a group is composed of only two types of character: group leader and group worker. In reality, a group may be composed of more than these two types of character. It is still unknown so far how the group composition will impact the measurement accuracy of the proposed Group EI measurement approach. Therefore, this is also considered as a limitation.

## 6.2 Future Work

Based on the limitation of the work in this thesis, the following future work is proposed to overcome the limitations:

- **Carrying out study on more participants from different domains -** As this research only carried out an experiment with participants from the university, the conclusions only apply to a certain type of participant. Although it is believed that the proposed Group EI measurement approach will be able to accurately measure the Group EI in different domains, it is not able to show this belief so far. In order to do this, it is necessary to carry out the experiment with more participants from different domains in the future. Furthermore, there are limitations in the group composition. It has been explained that only two types of characters are used in this research. If more experiments are carried out on participants from different domains, the group composition will become more complex, which can then address the group composition limitations of this research.

- **Understanding the impact of role and contribution assessment -** Possible future work could evaluate the impact on the proposed Group EI measurement approach if different role and contribution assessment approaches are used. So far in this thesis, only the 360 feedback questionnaire was used to perform this duty. This questionnaire may or may not be accurate enough to assess the roles and contributions. There are other approaches available to perform this duty. Therefore, it is necessary to compare different approaches and evaluate how each approach affects the proposed Group EI measurement approach. Also, if a more accurate role and contribution assessment approach is available or proposed, the level of correlation between the measured Group EI and group performance should also be demonstrated, so that if the proposed Group EI measurement approach is used in real-world situations, there will be higher confidence in its accuracy.

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## Appendix A

### The Short Version of Workplace Emotional Intelligence Profile (WEIP-S)

| Full Name | | Student ID | |
|---|---|---|---|
| Gender | | Age | |
| Department | | Program | |
| Group No. | | Date | |

We are asking you to participate in a research into group emotional intelligence in team work in UK. WEIP-S is a self-report questionnaire to measure emotional intelligence of individuals in the groups. This questionnaire will take 15 minutes to complete.
Please note that there is no right or wrong answer; try to respond on the basis of who you are, not who you would like to be. We will protect all the information you provided, and we promise that the results of your survey have no influence on your academic courses results. Your answers will make the contribution to Engineering Management group's research. Thus, please read the instructions for each of the following questions. Review the response options carefully before you mark your answers.
Please contact Siyu Wang, Department of Electronics, University of York, and email at syw505@york.ac.uk if you have any questions or comments about this survey.

| **Awareness of Own Emotions:** | Strongly Disagree | Disagree | Disagree Somewhat | Undecided | Agree somewhat | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| 1. I can explain the emotions I feel to team members. | | | | | | | |
| 2. I can discuss the emotions I feel with other team members | | | | | | | |
| 3. If I feel down, I can tell team members what will make me feel better. | | | | | | | |
| 4. I can talk to other members of the team about the emotions I experience. | | | | | | | |
| **Management of Own Emotions:** | | | | | | | |
| 1. I respect the option of team members, even if I think they are wrong. | | | | | | | |
| 2. When I am frustrated with fellow team members, I can overcome my frustrated. | | | | | | | |
| 3. When deciding on a dispute, I try to see all sides of a | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| disagreement before I come to a conclusion. | | | | | | | |
| 4. I give a fair hearing to fellow team members' ideas. | | | | | | | |
| **Awareness of Others' Emotions:** | | | | | | | |
| 1. I can read fellow team members 'true' feelings, even if they try to hide them. | | | | | | | |
| 2. I am able to describe accurately the way others in the team are feeling. | | | | | | | |
| 3. When I talk to a team member, I can gauge their true feelings from their body language. | | | | | | | |
| 4. I can tell when team members don't mean that they say | | | | | | | |
| **Management of Others' Emotions:** | | | | | | | |
| 1. My enthusiasm can be contagious for members of a team. | | | | | | | |
| 2. I am able to cheer team members up when they are feeling down. | | | | | | | |
| 3. I can get fellow team members to share my keenness for the project. | | | | | | | |
| 4. I can provide the 'spark' to get fellow team members enthusiastic. | | | | | | | |

## Appendix B

### 360-degree Assessment for Engineering Students in U.K

We are asking you to participate in a research into group emotional intelligence in teamwork in UK. 360-degree assessment is feedback that comes from members of an employee's immediate work circle to test group members' influence on Group EI. The questions are logical and different according to your different roles in the groups. Everybody needs to evaluate your group leaders; other team members and yourselves.

Please note that there is no right or wrong answer and the data captured will have no influence on your academic results.

Please refer to the consent form you signed for information about confidentiality and how we will manage the data captured.

Your answers will make the contribution to Engineering Management group's research. Thus, please read the instructions for each of the following questions. Review the response options carefully before you mark your answers.

Please contact Siyu Wang, Department of Electronics, University of York, Heslington, York, YO10 5DD, and email at syw505@york.ac.uk if you have any questions or comments about this survey.

*** 1. Personal Information:**

Full Name:

Student ID:

Age:

Department:

Program:

Group No. / Name:

* 2. Gender:

- Male
- Female

* 3. Which role do you play in your group?

- 1. Group Leader Jump to Q18
- 2. Team worker Jump to Q4

**Group Leader Evaluation**

* 4. How often does your group leader organize one group meeting?

- Extremely often (once or more a week)
- Very often (once every two weeks)
- Moderately often (1-2 times a month)
- Slightly often (once every two month)
- Not at all often (none or once a term)

Other (please specify)

* 5. Does your group leader notice you actively about the group meeting?

- Extremely active
- Very active
- Moderately active
- Slightly active
- Not at all active

Other (please specify)

* 6. How often does your group leader check your progress?

- Extremely often
- Very often
- Moderately often
- Slightly often
- Not at all often

Other (please specify)

* 7. Do you think your group leader can arrange and coordinate your group members' work reasonably?

- Extremely reasonable
- Very reasonable
- Moderately reasonable
- Slightly reasonable
- Not at all reasonable

Other (please specify)

* 8. How reasonable are the decisions made by your group leader?

- Extremely reasonable
- Quite reasonable
- Moderately reasonable
- Slightly reasonable
- Not at all reasonable

Other (please specify)

* 9. How often does your group leader listen to employees' opinions when making decisions?

- Extremely often
- Very often
- Moderately often
- Slightly often
- Not at all often

Other (please specify)

* 10. Do you think your group leader can timely communicate with you and other group members about his/ her ideas and decisions?

- Extremely timely
- Very timely
- Moderately timely
- Slightly timely
- Not at all timely

Other (please specify)

* 11. Do you think your group leader is good at coordinating relations in your group members?

- Extremely good at
- Very good at
- Moderately good at
- Slightly good at
- Not at all good at

Other (please specify)

* 12. If there are some conflict in your group members, do you think your group leader can deal with conflict reasonably?

- Extremely reasonable
- Quite reasonable
- Moderately reasonable
- Slightly reasonable
- Not at all reasonable

Other (please specify)

* 13. When you or other members make a mistake, how often does your group leader respond constructively?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

Other (please specify)

* 14. Do you think you can trust your group leader?

- Extremely trust

- Quite trust
- Moderately trust
- Slightly trust
- Not at all trust

* 15. Do you think your group leader played a positive influence on your group work?

- Extremely positive
- Quite positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Quite negative

16. What do you think about the influence of your group leader's Emotional Intelligence on your teamwork? Any comments or anything needs to be improved?

* 17. Overall, are you satisfied with your group leader, neither satisfied nor dissatisfied with him, or dissatisfied with him?

- Extremely satisfied
- Very satisfied
- Moderately satisfied
- Neither satisfied nor dissatisfied
- Moderately dissatisfied
- Very dissatisfied
- Extremely dissatisfied

Other (please specify)

**Peer Evaluation**

The questions listed in this page are evaluated you and other co-workers in your group. We will protect all the information you provided, and we promise that the results of your survey have no any influence on your academic courses results. Therefore, please answer the truth.

* 18. Who is the first co-worker you would like to evaluate? (Writing his/ her name)

* 19. How often is this member late to work?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 20. How much attention to detail does he/ she has?

- A great deal of attention
- A lot of attention
- A moderate amount of attention
- A little attention
- Not any attention at all

* 21. How often does he/she meet his deadlines?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 22. How hardworking is this member?

- Extremely hardworking
- Quite hardworking
- Moderately hardworking
- Slightly hardworking
- Not at all hardworking

* 23. Overall, how effective is his/her job?

- Extremely effective
- Quite effective
- Moderately effective
- Slightly effective
- Not at all effective

* 24. How well does this member communicate with others? Or how well does this member collaborate with others?

- Extremely well
- Very well

- Moderately well
- Slightly well
- Not at all well

* 25. How often does he/ she can accept your and others' suggestions?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 26. How often does he/she take responsibility for his mistakes?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 27. How respectfully does this member treat you?

- Extremely respectfully
- Quite respectfully
- Moderately respectfully
- Slightly respectfully
- Not at all respectfully

* 28. Does he/ she not hesitate to help a person in need?

- Extremely well
- Quite well
- Moderately well
- Slightly well
- Not at all well

* 29. Do you think you can trust him/ her, for example, you can tell the truth to him/ she, even when you know that will be better off by lying?

- A great deal of trust
- A lot of trust
- A moderate amount of trust
- A little trust
- Not any trust at all

30. What do you think about the influence of this group member's Emotional Intelligence on your teamwork? Any comments or anything needs to be improved?

31. Is the impact of this member on your work environment positive, neither positive nor negative, or negative?

- Extremely positive
- Quite positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Quite negative
- Extremely negative

**Peer Evaluation**

The questions listed in this page evaluate you and other co-workers in your group. We will protect all the information you provided, and we promise that the results of your survey have no any influence on your academic courses results. Therefore, please answer the truth.

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* 32. Who is the second co-worker you would like to evaluate? (Writing his/ her name)

* 33. How often is this member late to work?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 34. How much attention to detail does he/ she has?

- A great deal of attention
- A lot of attention
- A moderate amount of attention
- A little attention
- Not any attention at all

* 35. How often does he/she meet his deadlines?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 36. How hardworking is this member?

- Extremely hardworking
- Quite hardworking
- Moderately hardworking
- Slightly hardworking
- Not at all hardworking

* 37. Overall, how effective is his/her job?

- Extremely effective
- Quite effective
- Moderately effective
- Slightly effective
- Not at all effective

* 38. How well does this member communicate with others? Or how well does this member collaborate with others?

- Extremely well
- Very well
- Moderately well
- Slightly well
- Not at all well

* 39. How often does he/ she can accept your and others' suggestions?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 40. How often does he/she take responsibility for his mistakes?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 41. How respectfully does this member treat you?

- Extremely respectfully
- Quite respectfully
- Moderately respectfully
- Slightly respectfully
- Not at all respectfully

* 42. Does he/ she not hesitate to help a person in need?

- Extremely well
- Quite well
- Moderately well
- Slightly well
- Not at all well

* 43. Do you think you can trust him/ her, for example, you can tell the truth to him/ she, even when you know that will be better off by lying?

- A great deal of trust

- A lot of trust
- A moderate amount of trust
- A little trust
- Not any trust at all

44. What do you think about the influence of this group member's Emotional Intelligence on your teamwork? Any comments or anything needs to be improved?

* 45. Is the impact of this member on your work environment positive, neither positive nor negative, or negative?

- Extremely positive
- Quite positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Quite negative
- Extremely negative

**Peer Evaluation**

The questions listed in this page evaluate you and other members in your group. We will protect all the information you provided, and we promise that the results of your survey have no any influence on your academic courses results. Therefore, please answer the truth.

* 46. Who is the third co-worker you would like to evaluate? (Writing his/ her name)

* 47. How often is this member late to work?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 48. How much attention to detail does him/ she has?

- A great deal of attention
- A lot of attention
- A moderate amount of attention
- A little attention
- Not any attention at all

* 49. How often does he/she meet his deadlines?

- Always
- Most of the time

- About half the time
- Once in a while
- Never

* 50. How hardworking is this member?

- Extremely hardworking
- Quite hardworking
- Moderately hardworking
- Slightly hardworking
- Not at all hardworking

* 51. Overall, how effective is his/her job?

- Extremely effective
- Quite effective
- Moderately effective
- Slightly effective
- Not at all effective

* 52. How well does this member communicate with others? Or how well does this member collaborate with others?

- Extremely well
- Very well
- Moderately well
- Slightly well
- Not at all well

* 53. How often does he/ she can accept your and others' suggestions?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 54. How often does he/she take responsibility for his mistakes?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 55. How respectfully does this member treat you?

- Extremely respectfully
- Quite respectfully
- Moderately respectfully
- Slightly respectfully

- Not at all respectfully

* 56. Does he/ she not hesitate to help a person in need?

- Extremely well
- Quite well
- Moderately well
- Slightly well
- Not at all well

* 57. Do you think you can trust him/ her, for example, you can tell the truth to him/ she, even when you know that will be better off by lying?

- A great deal of trust
- A lot of trust
- A moderate amount of trust
- A little trust
- Not any trust at all

58. What do you think about the influence of this group member's Emotional Intelligence on your teamwork? Any comments or anything needs to be improved?

59. Is the impact of this member on your work environment positive, neither positive nor negative, or negative?

- Extremely positive
- Quite positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Quite negative
- Extremely negative

* 60. Do you have any more co-workers need to evaluate?

- Yes Jump to Q61
- No Jump to Q75

**Peer Evaluation**

The questions listed in this page evaluate you and other members in your group. We will protect all the information you provided, and we promise that the results of your survey have no any influence on your academic courses results. Therefore, please answer the truth.

* 61. Who is the fourth co-worker you would like to evaluate? (Writing his/ her name)

* 62. How often is this member late to work?

- Always
- Most of the time

- About half the time
- Once in a while
- Never

* 63. How much attention to detail does he/ she has?

- A great deal of attention
- A lot of attention
- A moderate amount of attention
- A little attention
- Not any attention at all

* 64. How often does he/she meet his deadlines?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 65. How hardworking is this member?

- Extremely hardworking
- Quite hardworking
- Moderately hardworking
- Slightly hardworking
- Not at all hardworking

* 66. Overall, how effective is his/her job?

- Extremely effective
- Quite effective
- Moderately effective
- Slightly effective
- Not at all effective

* 67. How well does this member communicate with others? Or how well does this member collaborate with others?

- Extremely well
- Very well
- Moderately well
- Slightly well
- Not at all well

* 68. How often does he/ she can accept your and others' suggestions?

- Always
- Most of the time
- About half of the time
- Once in a while

- Never

* 69. How often does he/she take responsibility for his mistakes?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 70. How respectfully does this member treat you?

- Extremely respectfully
- Quite respectfully
- Moderately respectfully
- Slightly respectfully
- Not at all respectfully

* 71. Does he/ she not hesitate to help a person in need?

- Extremely well
- Quite well
- Moderately well
- Slightly well
- Not at all well

* 72. Do you think you can trust him/ her, for example, you can tell the truth to him/ her, even when you know that will be better off by lying?

- A great deal of trust
- A lot of trust
- A moderate amount of trust
- A little trust
- Not any trust at all

73. What do you think about the influence of this group member's Emotional Intelligence on your teamwork? Any comments or anything needs to be improved?

74. Is the impact of this member on your work environment positive, neither positive nor negative, or negative?

- Extremely positive
- Quite positive
- Somewhat positive
- Neither positive nor negative
- Somewhat negative
- Quite negative
- Extremely negative

**Evaluate Yourselves**

The questions listed in this page evaluate you and other members in your group. We will protect all the information you provided, and we promise that the results of your survey have no any influence on your academic courses results. Therefore, please answer the truth.

* 75. How often are you late to work?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 76. How much attention to detail do you has?

- A great deal of attention
- A lot of attention
- A moderate amount of attention
- A little attention
- Not any attention at all

* 77. How often do you meet your deadlines?

- Always
- Most of the time
- About half the time
- Once in a while
- Never

* 78. How hardworking is you?

- Extremely hardworking
- Quite hardworking
- Moderately hardworking
- Slightly hardworking
- Not at all hardworking

* 79. Overall, how effective is your job?

- Extremely effective
- Quite effective
- Moderately effective
- Slightly effective
- Not at all effective

* 80. How well does you communicate with others? Or how well do you collaborate with others?

- Extremely well
- Very well
- Moderately well

- Slightly well
- Not at all well

* 81. How often do you can accept your and others' suggestions?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 82. How often do you take responsibility for your mistakes?

- Always
- Most of the time
- About half of the time
- Once in a while
- Never

* 83. How respectfully do you treat you?

- Extremely respectfully
- Quite respectfully
- Moderately respectfully
- Slightly respectfully
- Not at all respectfully

* 84. Do you not hesitate to help a person in need?

- Extremely well
- Quite well
- Moderately well
- Slightly well
- Not at all well

* 85. Do you think you can be trusted by other team workers?

- A great deal of trust
- A lot of trust
- A moderate amount of trust
- A little trust
- Not any trust at all

86. What do you think about the influence of your Emotional Intelligence on your teamwork? Any comments or anything needs to be improved? What's else do you want to comment?

87. Is the impact of you on your work environment positive, neither positive nor negative, or negative?

- (•) Extremely positive
- ( ) Quite positive
- ( ) Somewhat positive
- ( ) Neither positive nor negative
- ( ) Somewhat negative
- ( ) Quite negative
- ( ) Extremely negative