Emotional Intelligence Competencies as Antecedents of Innovation

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Abstract: Innovation is the process of bringing new products and services to the marketplace. The innovation process engages mixed teams with personnel from design, engineering, manufacturing and marketing working in tandem at all times. Given the complexity of the information flows in such a process, value creation in new product development is almost exclusively based on intangible resources. The successful management of intellectual capital has emerged as a key condition for effective organizational learning in the innovation process. The study of creativity and innovation has occupied a broad spectrum of experts across the fields of behavioral science, human cognition and organizational behavior. Empirical research in the past has provided some evidence that a team leader's emotional intelligence impacts new product outcomes. Recent research however indicates that emotional intelligence at the individual team member level may contribute more to creativity in new product development. This paper builds upon the results of a small pilot study designed to assess the way group member emotional competencies impact the success of the innovation process in the presence of moderating factor such as project complexity. The outcome of this pilot study, the design of which is detailed in this paper, indicates that emotional intelligence improves team interactions, facilitates the management of intellectual capital and does indeed affect innovation performance. More importantly, the pilot study identified distinct differences in the ways individual emotional intelligence competencies behave as antecedents of innovation. This paper seeks to illuminate these differences by examining a larger sample of engineering and management individuals and focusing on the relationship between individual emotional intelligence competencies and their effect on the collective emotional intelligence continuum.

Keywords: Emotional Intelligence, innovation process, new product development, interdisciplinary teams, innovation antecedents.

1. Introduction

Innovative businesses thrive by anticipating market trends and needs and responding in fashion with improved products or brand-new ones that meet and exceed customer expectations. Creating business growth through innovation is considered the most important business challenge today. The introduction of new products or services is based on entrepreneurial opportunities (Eckhardt and Shane, 2003) that are triggered by creative associations. Creative associations are defined as novel agglomerations of knowledge that are potentially valuable within a particular business domain (Ford, 1996).

The product development process evolves sequentially through the phases of identifying opportunities, generating and screening ideas, elaborating and testing concepts, and finally developing and market-testing products. Between the phases of the process are evaluation tasks or decision points often referred to as gates, where the information flows are channelled properly and hard decisions ("go"/ "no go") are taken. Innovative product development is thus a knowledge-intensive process that requires sophisticated knowledge management skills (Hsu and Fang 2009; Massaro, Dumay and Garlatti 2015). Entrepreneurial opportunities are not simply recognized, but created as a result of iterative, creative and social dynamics (Ford 2006).

The situation is further complicated by the pressure to accelerate time-to-market which often leads to fuzzy gates ("conditional go") so as not to slow down the development process. The use of fuzzy gates means that there is phase-overlapping and cross-functional teams must be employed to accomplish this. Paradoxically, uncertainty, time pressure, and competition inhibit creativity during its early stages, but appear to facilitate innovation at later stages (West, Sacramento and Fay, 2006).

The new product development process is thus dependent upon such mixed teams with personnel from design, engineering, manufacturing and marketing working in tandem at all times. The diversity of knowledge represented in the creative team is an important issue. Given the complexity of the information flows in such a process, value creation in product development is almost exclusively based on intangible resources. The successful management of intellectual capital has emerged as a key condition for effective organizational learning in the innovation process (Chen, Lin and Chang 2006; Chen *et al* 2014). In creating new entrepreneurial opportunities, it is imperative to recognize the dynamic interplay between creative associations and social networks (Ford 2006, Massaro et. Al. 2016).
The leadership exercised by the project manager of the innovation process is an important factor in the management of intellectual capital. While leadership has long been recognized as essential for organizational success in general, it is

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only recently that it has received attention specific to the innovation process. The importance of emotional intelligence (EI) of the team leader in improving new product development performance is generally well understood and accepted because of the role that emotions can play in team interactions and effectiveness (Rezvani *et al*. 2016). There are of course minority views on the issue claiming that EI is not essential for leadership (McCrimmon 2009). Recently it was proposed that "a team member's EI is an *antecedent* of an individual's creativity in NPD" and that "studies investigating how best to manage NPD teams need to include EI in order to capture the true impact of individual team members' on team effectiveness" (Barczak, Lassk and Mulki 2015). The premise that the emotional intelligence of the individual team members may contribute more to creativity in new product development than that of the leader is an intriguing proposition. Shifting the focus from the leader to the team members and ultimately the combined EI of the team maybe critical in understanding the role of EI in the innovation process and the management of intellectual capital flows in the organization (Massaro, Dumay and Bagnoli 2015).

In fact, it has been hypothesized that the management of intellectual capital has distinct characteristics influencing project success and that different factors influence project success in managing innovation teams (primarily intangible resources) and in managing production teams (primarily tangible resources). Empirical research in the past has provided some evidence that a team leader's emotional intelligence impacts innovation performance. This evidence however has to be assessed against the well-established impact of team members (Hargadon & Sutton, 1997) to innovation in the product development process. The creative potential of groups is facilitated or hindered by the way group members share, process, and select ideas (Nijstad, Rietzschel and Stroebe, 2006; Verma and Sinha, 2016).

A body of knowledge has been accumulating on the influence of group dynamics to the cognitive foundations of creativity. In brainstorming sessions, the illusion of group productivity is contrasted with the empirical evidence on the ineffectiveness of brainstorming groups (Sutton and Hargadon ,1996; Paulus, Nakui and Putnam, 2006). The counterintuitive concept that changes in team membership stimulate team creativity stimulates organizations to tolerate and even encourage reorganizations of their innovation teams (Choi and Thompson, 2006). The underlying thesis is that as innovation teams become more task-focused, newcomers not only enhance the team's knowledge-base, but also empower social processes that are conducive to creativity. Because the creative process involves divergent thinking, it is a risk. The presence of psychological safety in a team (the belief that is that others will respond positively when a team member takes a risk) provides a critical foundation for creativity and ushers the issue of personality to the innovation process (Edmondson and Mogelof, 2006).

Empirical results suggest that high emotional intelligence increases the extent of knowledge-sharing and may have positive impact on team performance among cross-functional team members (Verma and Sinha, 2016). The link between emotional intelligence and knowledge sharing has been identified in the literature (Rivera-Vazquez *et al*. 2009; Karkoulian *et al*., 2010; Baruch and Lin, 2012; Goh and Lim, 2014; Mueller, 2015) but few empirical data exist. To fill this gap, the purpose of this paper is to examine the relationship between emotional intelligence and new product development performance.

For an analysis of this type the issue of definitions is crucial. Emotional intelligence (EI) is broadly speaking the "ability of individuals to recognize their own and other people's emotions, to discriminate between different feelings and label them appropriately, and to use emotional information to guide thinking and behavior" according to the seminal definition of (Goleman 1996) and its derivatives in (Coleman 2008). EI can be considered as either a set of cognitive abilities (*ability models*), or as a set of abilities combined with a broad range of personality traits (*mixed models*). Both the ability and the mixed models have strengths and limitations (Caruso, Mayer and Salovey 2001). For the purposes of this paper, EI is assumed to have four specific dimensions:

- Self Awareness
- Self Management
- Social Awareness
- Relationship Management

and care is exercised to test for possible collinearities between these dimensions.
Similarly, New Product Development (NPD) performance is a multidimensional construct which may include market performance, financial performance, customer satisfaction, and product life-cycle (Brown and Eisenhardt, 1995). In the context of this paper however, NPD is specifically defined as the level of anticipated market success as polled by a group of experts.

With these definitions at hand, reaching the aims of the paper involves a two-step research method. First, a small pilot study was designed to assess the way group member emotional competencies impact new product development performance in the presence of moderating factor such as project complexity (Tsakalerou, 2016). The outcome of this pilot study indicated that emotional intelligence improves team interactions, facilitates the management of intellectual capital and does indeed affect innovation performance. Second, the sample was enlarged and correlation analysis was then used to test the relationship between individual emotional intelligence competencies and their effect on the collective emotional intelligence continuum.

In this context, the paper is organized as follows. In Section 2, the hypothesis of the pilot study is stated, the design of the study is detailed and the results are summarized. In Section 3, a larger experimental dataset is developed as the basis for examining whether the observations of the pilot study are indeed indicative of a more general trend. In Section 4, an exhaustive data analysis is performed to support the outcomes of this paper. Finally, in Section 5, the conclusions are summarized and the research issues to explore further are highlighted.

2. Pilot Study

The hypothesis of the pilot study was that the usage of emotional information navigates attitudes, effectiveness and behaviour in team interactions and that the emotional intelligence of individual team members (as well as of the design team as a whole) directly impacts innovation performance. In organizational theory, the coordination of many interdependent actors in NPD projects is recognized as a key activity and complexity inevitably arises from the interaction of many simple components (Mihm 2003).

With increasing project complexity, it is becoming naturally difficult to compare NPD performance across a product range within the same company or between competing companies. It is even more difficult to compare apparently dissimilar products, with distinct commercial characteristics and perceived newness to the company and the market (Barclay and Dan 2000). The issue of complexity is essential in assessing disparate projects.

The moderating effect of project complexity on the relationship between emotional intelligence of the design group and success in product development projects was thus assessed in detail in the pilot study. According to the typology proposed in (Williams 2002) there are three broad dimensions of complexity:

- *Complexity of faith:* this complexity is present when creating a unique product, with uncertain outcome, but with a lot of faith in the process.
- *Complexity of fact:* this complexity is present when dealing with a huge amount of interdependent factual data but no real uncertainty in the process.
- *Complexity of interaction:* this complexity is present where the interests of the parties involved are often unclear and conflicting, and the inter-relationships play an important role.

With these definitions in place, the objective of the pilot study was to examine the impact of the EI of individual team members (as well as of the design team as a whole) on innovation performance for NPD processes of varied complexity (Figure 1).

In the context of the pilot study, 16 scientists and engineers were asked to work in small groups and tasked to develop a few innovative product and service concepts. The concepts presented were assessed both in terms of their perceived complexity and in terms of their presumed performance in the market. The data collected were then analyzed against the emotional intelligence makeup of the members of each group. The aggregation of the findings of this pilot study in a small number of classes was used to identify only major trends in the data.

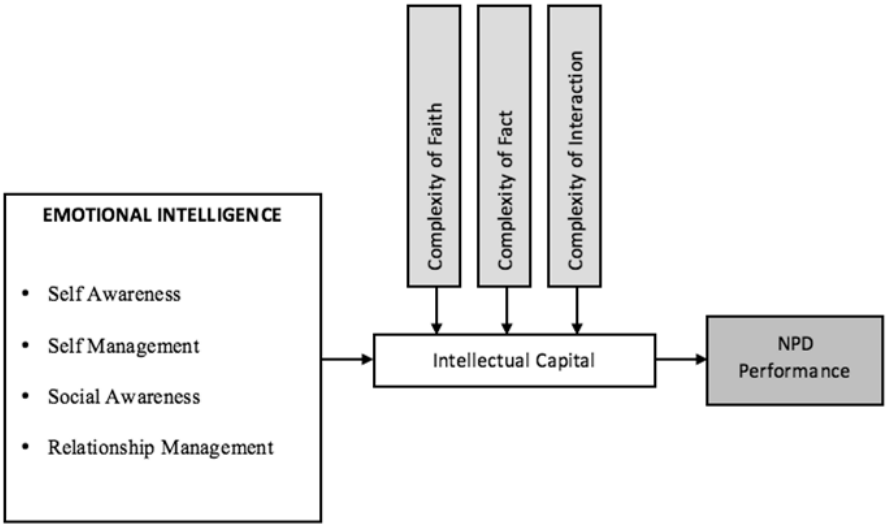

Figure 1: The effect of EI on NPD performance moderated by project complexity

The population of the pilot study was the scientists and engineers enrolled in the project-based course *New Product Development* of the Master of Engineering Management Program jointly offered by the Graduate School of Business and the School of Engineering at Nazarbayev University (Tsakalerou 2016). A total of 16 scientists and engineers (S1÷S16) were asked to work in small groups and tasked to develop an innovative product concept. The four groups of four members each generated four new product concepts: P1, P2, P3 and P4 respectively (Table 1).

Table 1: The four new product concept development teams

TEAM	MEMBERS	CONCEPT
T1	S01, S02, S03, S04,	P1
T2	S05, S06, S07, S08	P2
T3	S09, S10, S11, S12	P3
T4	S13, S14, S15, S16	P4

The product concepts were assessed independently by two faculty members, one from the School of Engineering and one from the School of Science and Technology, for each one of the three dimensions of complexity, faith fact and interaction, and the results were then averaged. The scoring scale for all dimensions was 1, 2 or 3 in increasing order of complexity, for a common level of total complexity equal to 6. Similarly, each new product concept was assessed in terms of its presumed performance in the market, and was ranked accordingly from best expected to least expected performance. As this is a rather subjective measure, it was graded coarsely from 4 (best) to 1 (worst). Performance expectations and project complexities are summarized in Table 2.

Table 2: Concept complexities and expected performance

CONCEPT	Complexity of faith	Complexity of fact	Complexity of interaction	Performance
P1	3	2	1	2
P2	1	2	3	3
P3	2	1	3	1
P4	1	3	2	4

All 16 scientists were tested for EI with the *LeaderShape* self-assessment tool via its free app available for Android and iOS (LeaderShape 2015) and reported their scores anonymously on the cloud. LeaderShape returns one of three possible outcomes for each dimension of EI:

- needs improvement;
- probable success; and
- a natural

To facilitate the analysis, the outcome “needs improvement” received a grade of 1, the outcome “probable success” received a grade of 2 and the outcome “a natural” received a grade of 3. The results from LeaderShape are tabulated in Table 3.

Grouping all variables into a small number of classes (typically 3 or 4) provides an effective way to reduce the effect of noise in the data. The objective is to be able to identify major trends, if they exist, and design a bigger study based on the preliminary outcomes of the pilot. In this context, the average scores for each group in Table 3 are computed only to the first decimal digit. For reasons of uniform scaling, the total EI score is reported as the average of the SlfA, SlfM, SocA and RelM scores and *not* as their direct sum.

Further inspection of the scores in Table 3 reveals that the total EI in groups T2 and T3 is evenly distributed in its four dimensions. The lagging of group T1 is uniform in all dimensions while the leading of group T4 is primarily due to the self-awareness and relationship management sub scores.

Table 3: Emotional intelligence scores of team members for each product concept

MEMBER	TEAM	Self Awareness	Self Management	Social Awareness	Relationship Management	TOTAL EI
S01	T1	2	2	2	2	2.0
S02		2	2	2	3	2.3
S03		1	2	1	1	1.3
S04		2	2	2	2	2.0
Group Score:		1.8	2.0	1.8	2.0	1.9
S05	T2	3	3	2	2	2.5
S06		2	1	2	2	1.8
S07		2	2	3	2	2.3
S08		2	2	3	2	2.3
Group Score:		2.3	2.0	2.5	2.0	2.2
S09	T3	2	2	3	2	2.3
S10		2	3	2	2	2.3
S11		2	2	2	2	2.0
S12		2	2	2	2	2.0
Group Score:		2.0	2.3	2.3	2.0	2.2
S13	T4	3	2	2	2	2.3
S14		3	3	3	3	3.0
S15		3	2	2	2	2.3
S16		2	2	2	3	2.3
Group Score:		2.8	2.3	2.3	2.5	2.5

The individual EIs collected for the 16 members in Table 3 were first tested for normality. The histogram and Anderson-Darling normalcy test Q in Figure 1 reveal that the EI scores are almost normally distributed with a slightly "light" right tail.

The right tail is due to the value of EI = 3.0 for member S14. While this value is not a real outlier, excluding it does not substantially change the statistics (Count = 15, Mean = 2.10, Stdev = 0.30) or the normality of the distribution (A-Squared = 1.446, P-Value = 0.0006).

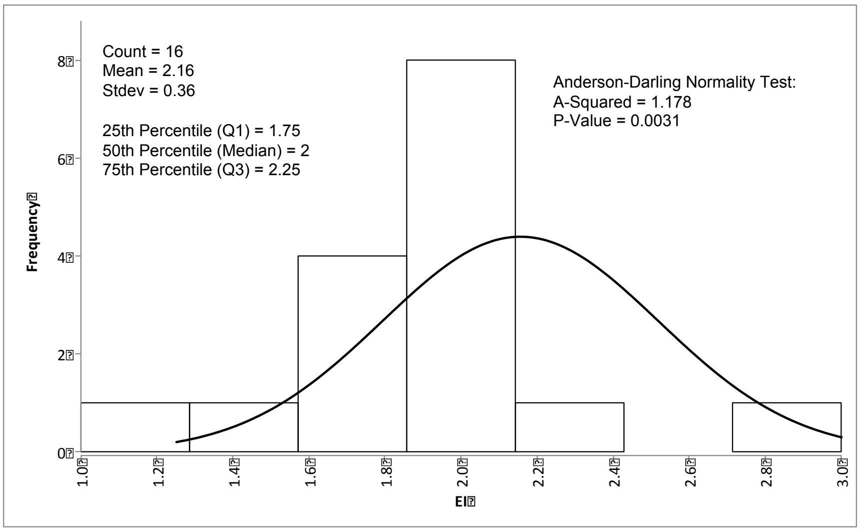

Figure 2: Histogram and Anderson-Darling normalcy test for individual EI scores in Table 3

As the stated objective has been to examine the possible influence of EI on innovation performance in the presence of variant project complexity, Table 4 presents the correlation matrix of the following variables:

- Self-Awareness (*SlfA*)
- Self-Management (*SlfM*)
- Social Awareness (*SocA*)
- Relationship Management (*RelM*)
- Emotional Intelligence (*EI*)
- Innovation Score (*Inno*)
- Complexity of Faith (*Faith*)
- Complexity of Fact (*Fact*)
- Complexity of Interaction (*Inter*)

Table 4: Correlation matrix of the new product concept development process

	SlfA	*SlfM*	*SocA*	*RelM*	*EI*	*Inno*	*Faith*	*Fact*	*Inter*
SlfA	1.00								
SlfM	0.40	1.00							
SocA	0.32	0.15	1.00						
RelM	0.40	0.20	0.40	1.00					
EI	0.77	0.62	0.68	0.71	1.00				
Inno	**0.58**	**0.00**	**0.16**	**0.35**	**0.40**	1.00			
Faith	-0.61	-0.08	-0.47	-0.23	-0.51	**-0.67**	1.00		
Fact	0.50	0.00	0.00	0.37	0.31	**0.95**	-0.43	1.00	
Inter	0.18	0.08	0.47	-0.08	0.24	**-0.13**	-0.64	-0.43	1.00

In the interpretation of the correlation coefficients in Table 4, it should be taken into consideration that for a sample of N=16 the minimum correlation coefficients for confidence intervals of 10%, 5%, 1% and 0.1% are r=0.43, 0.50, 0.62 and 0.74 respectively.

From Table 4, it appears that the EI components are somewhat correlated. SlfA, SlfM, SocA and RelM that is are not really independent dimensions of EI although they appear to be its constituents.

Innovation score and EI exhibit nontrivial correlation (r=0.40) which is primarily due to SlfA (r=0.58) and to a lesser extent to RelM (r=0.35) scores. SlfM and SocA appear to be uncorrelated to the performance score of the projects (r=0.00 and 0.16 respectively).

Innovation score and project complexity are positively correlated for projects of high complexity of fact (r=0.95), negatively correlated for projects of high complexity of faith (r=-0.67) and uncorrelated for projects of high complexity of interaction (r=-013).

The pilot study thus reveals that EI clearly influences innovation performance but the exact effect is moderated by the type of project complexity involved. The design of a larger study to assess this effect should take into consideration the following issues.

- High complexity of fact is strongly correlated with the expected performance score of new product development. High complexity of interaction appears to be uncorrelated to the performance score. The focus should thus be on carefully selected test projects of high complexity of faith (true innovation) to assess whether the perceived negative correlation with EI is indeed true.
- Further assessment should be based on a larger number of groups (typically more than 5) with a larger number of members (typically more than 8 or 10) to calibrate properly the effect of group dynamics (or group as opposed to individual EI) on project performance.

More importantly though, the dimensions of EI that appear to be correlated with innovation performance are Self-Awareness and Relationship Management. Self-Management and Social Awareness do not appear to have an impact. This issue should be explored further to decide whether one should focus exclusively on the SlfA and RelM competencies of EI rather than on the full complement measured by LeaderShape.

The objective of this study is to examine the relationship between these competencies over a larger experimental dataset to verify whether the observations of the pilot study indicate a more general trend or whether they can be attributed to the small data set and thus dismissed.

3. Sample Enlargement

To test for consistency of the *LeaderShape* self-assessment tool, the participants of the pilot study (graduate students enrolled in the Master of Engineering Program at Nazarbayev University – group “NU”) were re-tested and their scores were compared with the previous ones. Only 14 of the original 16 participated in this phase and the results are tabulated in Table 5.

Table 5: Emotional intelligence scores of group “NU” members

WK1	SlfA	SlfM	SocA	RelM	TOTAL EI
1	2	2	2	2	2.0
2	2	2	2	3	2.3
3	1	2	1	1	1.3
4	2	2	2	3	2.3
5	2	2	2	2	2.0
6	2	2	2	2	2.0
7	3	3	2	2	2.5
8	2	1	2	2	1.8
9	2	2	3	2	2.3
10	2	2	3	2	2.3
11	2	3	2	2	2.3
12	2	2	2	2	2.0
13	3	2	2	2	2.3
14	3	3	3	3	3.0
AVERAGE	2.1	2.1	2.1	2.1	2.1
SDEV	0.5	0.5	0.5	0.5	0.4

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While the reporting of the results remained anonymous to a certain depth of the group, the test for consistency with the results recorded in Table 3 was satisfied (only the distribution of individual EI competencies within the group is examined). Two additional groups of 26 and 22 students (juniors and seniors enrolled in the course *Managerial Decision Modeling* offered by the College of Business and Public Management of Kean University at Wenzhou – groups "WK1" and "WK2") were added to the original sample used for the pilot study. All students participated voluntarily and reported their results in Table 6 anonymously.

By examining the data from all three groups, it appears that EI is normally distributed across "NU", "WK1" and "WK2" with mean values of 2.1, 1.8 and 2.0. (While the difference in the means in not very statistically significant, it may indicate a slight trend of increasing EI with years of schooling, a point certainly worth pursuing in a future study). Even more importantly, individual competency scores for SlfA (mean values of 2.1, 2.0 and 2.0), SlfM (mean values of 2.1, 1.9 and 2.0), SocA (mean values of 2.1, 1.8 and 2.1), and RelM (mean values of 2.1, 1.8 and 2.0) were also normally distributed. The similarity of the characteristics of EI exhibited in all three groups is sufficient to enable the agglomeration of all data points in one large set of 62 samples comprising of "NU", "WK1" and "WK2" members. Unsurprisingly, this composite dataset is also normally distributed across emotional intelligence (Figure 3) and its individual competencies with mean values of 2.0 (EI, SlfA, SlfM, SocA) and 1.9 (RelM).

Table 6: Emotional intelligence scores of group "WK1" and "WK2" members

WK1	SlfA	SlfM	SocA	RelM	TOTAL EI
1	1	2	1	1	1.3
2	1	1	1	2	1.3
3	3	3	3	3	3.0
4	2	1	1	2	1.5
5	2	2	3	1	2.0
6	2	2	2	2	2.0
7	3	3	3	3	3.0
8	1	2	2	2	1.8
9	2	2	1	2	1.8
10	2	2	1	2	1.8
11	1	2	2	2	1.8
12	2	2	2	2	2.0
13	2	2	1	2	1.8
14	2	2	2	2	2.0
15	2	2	2	2	2.0
16	2	3	2	1	2.0
17	2	2	1	1	1.5
18	3	2	2	1	2.0
19	3	2	3	2	2.5
20	2	1	2	2	1.8
21	2	1	1	2	1.5
22	2	1	1	2	1.5
23	2	1	1	1	1.3
24	2	2	2	1	1.8
25	2	2	2	2	2.0
26	1	2	2	1	1.5
AVERAGE	2.0	1.9	1.8	1.8	1.8
SDEV	0.6	0.6	0.7	0.6	0.4

WK1	SlfA	SlfM	SocA	RelM	TOTAL EI
1	2	2	2	2	2
2	2	2	3	3	2.5
3	2	2	1	2	1.8
4	2	2	2	3	2.3
5	2	2	2	3	2.3
6	1	1	1	1	1.0
7	2	2	1	1	1.5
8	2	2	1	1	1.5
9	2	2	2	2	2.0
10	2	2	2	2	2.0
11	2	2	2	1	1.8
12	2	3	3	3	2.8
13	2	2	3	2	2.3
14	3	2	2	2	2.3
15	2	3	3	2	2.5
16	1	1	1	1	1.0
17	3	2	3	3	2.8
18	2	2	2	2	2.0
19	2	1	3	1	1.8
20	2	2	2	2	2.0
21	3	2	2	2	2.3
22	2	2	3	2	2.3
AVERAGE	2.0	2.0	2.1	2.0	2.0
SDEV	0.5	0.5	0.7	0.7	0.5

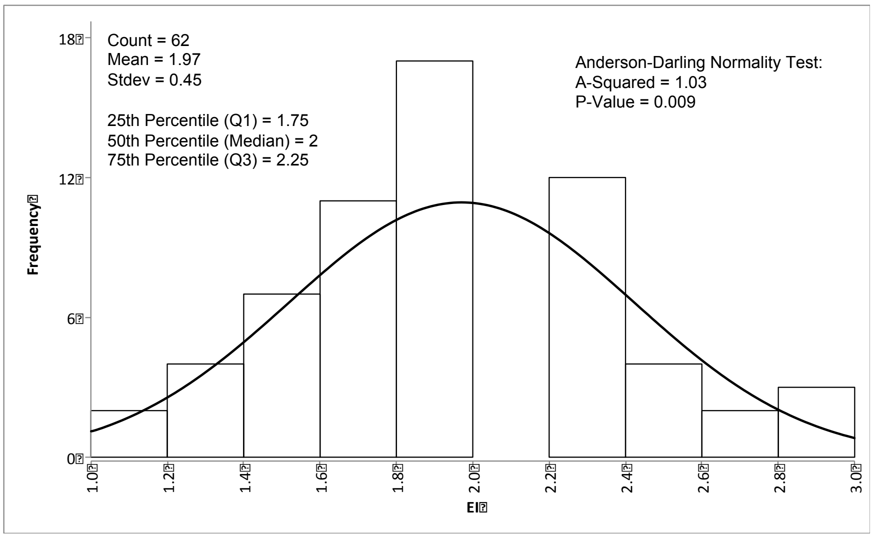

Figure 3: Histogram and Anderson-Darling normalcy test for individual EI scores

4. Data Analysis

The overall normalcy of the results in Figure 3 may of course disguise a wealth of information on the relative strength of individual competencies of EI. The correlation between the competencies SlfA, SlfM, SocA and RelM and the overall EI is presented in summary form in Figure 4. (While all the values for SlfA, SlfM, SocA and RelM in Tables 5 and 6 are integers, the graphs below present the individual data points artificially away from each other to enable a graphical representation of the clustering of values).

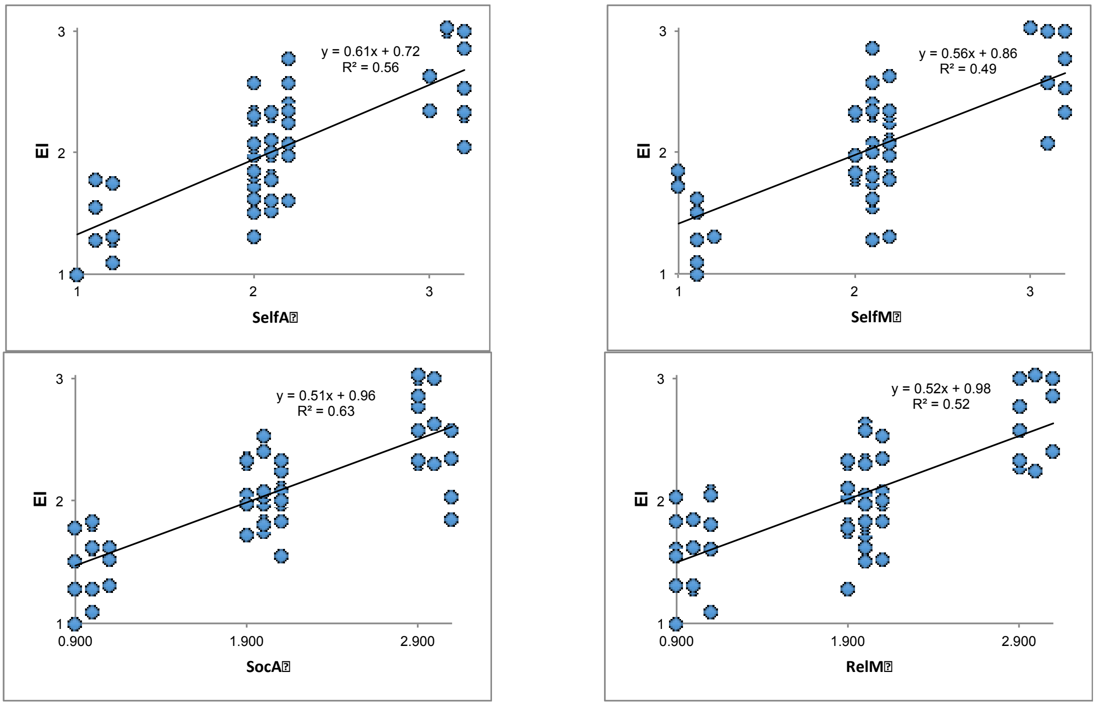

Figure 4: Correlations between EI and its individual competencies SlfA, SlfM, SocA and RelM.

Figure 4 reveals that the squared correlation coefficient R^2 has a reasonably large value in all four cases (0.56, 04.9, 0.63 and 0.52) and indicates a real relationship, but it also shows that no one individual competency can fully predict EI. R^2 however does not indicate whether the presumed independent variables SlfA, SlfM, SocA and RelM are a cause of the changes in the dependent variable EI. Furthermore, R^2 cannot identify whether there is collinearity present in the data on the individual competencies.

Collinearity is a phenomenon in which two or more of the individual competencies are highly correlated, and thus one can be linearly predicted from the others with significant accuracy. Collinearity does not necessarily reduce the reliability of the EI model as a whole, at least within the sample data set; it only affects calculations regarding individual competencies and identifies which ones are redundant with respect to the others. In this context, the scatter plot matrix of EI and its individual competencies in Figure 5 provides valuable evidence on the issues of potential collinearity present between SlfA, SlfM, SocA and RelM. The Variance Inflation Factors (VIF) summarized in Table 7 have values less than 1.5 indicating that there is weak evidence of collinearity, but not enough to be overly concerned about.

Table 7: Collinearity of EI competencies

Predictor Term for EI	SelfA	SelfM	SocA	RelM
Variance Inflation Factor	1.335	1.381	1.495	1.296

The important outcome of the data analysis is that the presumed independent variables SlfA, SlfM, SocA and RelM are indeed so. Thus the hypothesis of the pilot study that perhaps one should focus exclusively on the SlfA and RelM competencies of EI rather than on the full complement measured by LeaderShape is not supported.

It remains of course an open question whether the SlfA and RelM competencies of EI are the major predictors of innovation success. If that is indeed the case, it is obviously not a result of a deficiency of the predictive value of the model

$$EI = SlfA + SlfM + SocA + RelM, \text{ or}$$

$$EI = \frac{1}{4}(SlfA + SlfM + SocA + RelM)$$

but rather that not all emotional intelligence competencies are antecedents of innovation. This will of course require further exploration through a new, carefully crafted and controlled study.

5. Conclusions

The successful management of intellectual capital during new product developments has emerged as a key condition for an effective innovation process. Product development engages mixed interdisciplinary and intra-departmental teams managing information flows in a cohesive way. Value creation in product development is almost exclusively based on intangible resources and depends greatly upon organizational learning.

The pilot study presented in this paper has provided some evidence that emotional intelligence at the individual team member level is related to project performance. The pilot study revealed that creativity is influenced by group member emotional competencies in specific areas, such as self-awareness and relationship management. Furthermore, the pilot study identified that when moderating factors such as project complexity are taken into consideration, the effect is more pronounced on projects that appear to be the most innovative.

Expanding the dataset from 14 to 62 data points has confirmed the consistency of the LeaderShape self-assessment tool thus verifying its utility in studies assessing the effects of emotional intelligence on innovative performance. Extensive analysis of the larger dataset did not reveal any co-dependencies of the EI competencies and thus all of them are *in principle* considered antecedents of innovation. The increased emphasis on the Self-Awareness and Relationship Management competencies that has emerged from the pilot study, is intriguing as it echoes findings of other studies on the cognitive and social dimensions of innovation. Nevertheless, this outcome needs to be verified further.

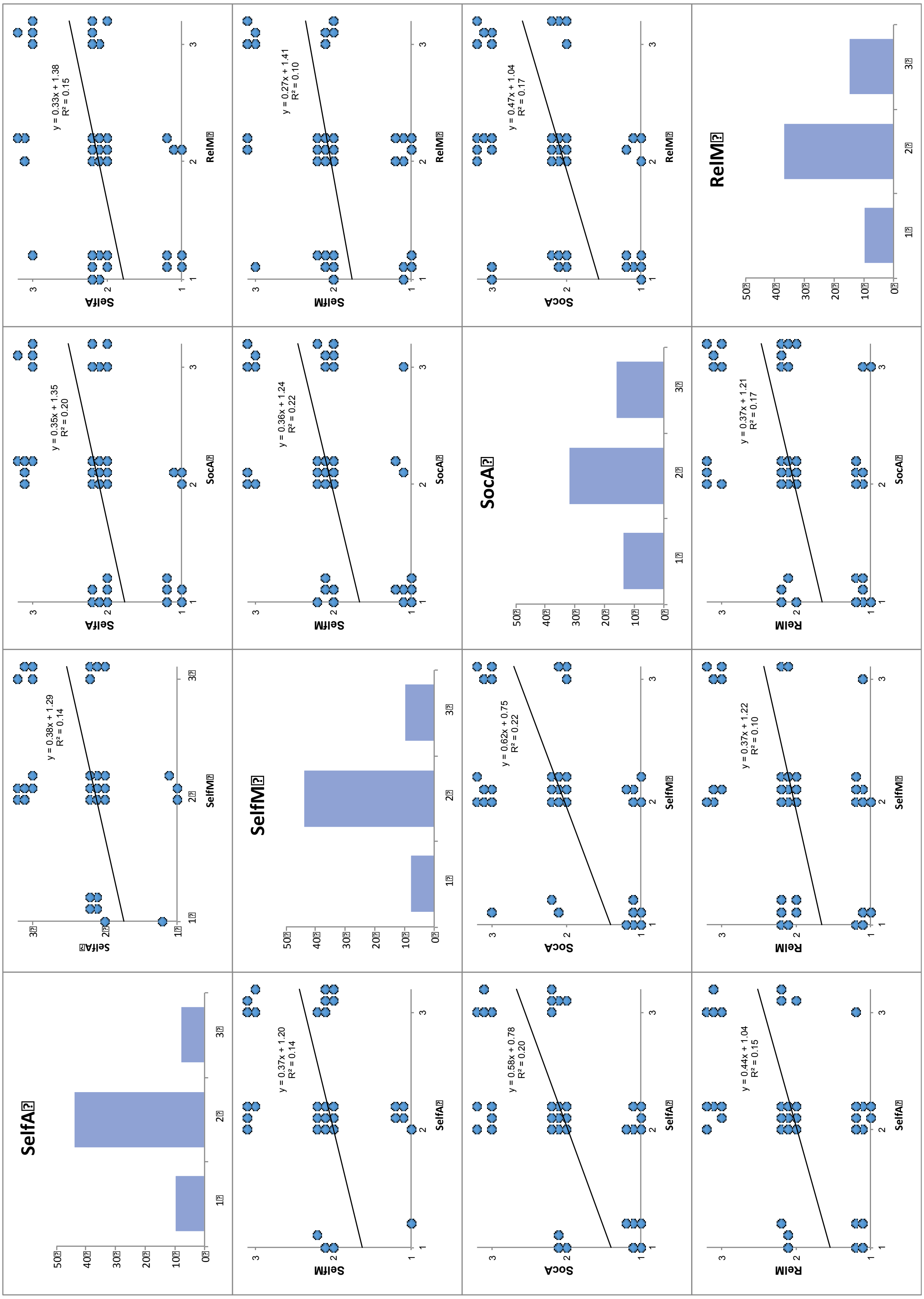

Figure 5: Scatter Plot Matrix of EI and its individual competencies

Considering that the data of this study have been collected mainly from Kazakhstan and China, any relevant findings should be generalized with caution. In fact, it will be interesting to investigate the role of innovation antecedents from a cross-cultural and possibly multi-national perspective (Khalil 2016). In addition, given the mixed profile of the sample, the current data does not illuminate the role of gender in the innovation process. Future research may focus on the role of gender along with other demographic variables (such as age, experience and job level) some of which seem to affect (weakly at least) emotional intelligence.

Despite the fact that the current study only offers some initial insights on EI competencies as antecedents of innovation, the findings are significant and present interesting opportunities for future research. A few theoretical questions remain of course unanswered. The larger question whether emotional intelligence does improve team interactions and facilitate knowledge sharing in new product development requires of course further study. The pilot study in this paper and the evidence that emerged from the extended dataset provide valuable insight on the design characteristics of a larger experiment that could lead to decisive answers on the relationship between emotional intelligence and innovation success.

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