A Study on the Relative Importance of Underlying Competencies of Business Analysts

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Abstract

Business analysis is a key factor of project success or failure in information systems. However, there are few studies on business analysis competencies. The objective of this paper is to identify which competencies a business analyst (BA) needs, and analyze the importance weights and priorities of business analysis competencies. Literature review yielded 6 competency dimensions and 30 competencies. Based on interviews with 12 experts and analytic hierarchy process analysis, the relative importance weight and priority of each business analysis competency were analyzed. Moreover, an importance–perception gap between stakeholders in different positions was identified. This result can be used as selection and development criteria for superior BAs that are responsible for solving business problems using information systems solutions.

Keywords: Business Analysis; Business Analyst; Underlying Competency; Requirements Engineering; AHP Analysis; Importance–Perception Gap

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1. Introduction

According to the Chaos Report, the project success rate in information systems development environment is only 39%, while the failure rate is 61%. The more worrying result of the report is that large project success rate was 10% in 2012 [1] and 6% from 2003 to 2012 [2]. There are many reasons for projects to be terminated or delayed [3]. The main causes that lead a project to failure are lack of project understanding [4], less user involvements [5-7], requirements uncertainty [8-10] or change of requirements [11, 12].

The requirement is a documented representation of a condition or capability needed by users to solve problems [13, 14]. Requirements are documented wants or needs of users that must be identified or analyzed for analysts or developers to solve problems. However, documented requirements are usually unclear, because there is a large communication gap between users and developers [15-17]. The reason for this gap is that developers are usually using a different language from users, which are seldom involved in projects. As such, it is an obstacle for analysts or developers to provide solutions to users [5].

Requirements engineering is a good solution to remove the obstacles regarding requirements. It is a systematic and disciplined approach to identify, analyze, and specify requirements and it provides guidelines on requirements processes or techniques, such as elicitation, analysis, specification, and traceability [18-22]. Requirements engineering is useful for effective communication with stakeholders for project success [23, 24] as ineffective communication on requirements may result in project failure [25].

There are several types of requirements in requirements engineering, among which, user requirements and system requirements are key to be identified, traditionally, by system analysts. However, user requirements are easily disappearing [26]. Once system analysts identify user requirements, they promptly transfer them to system ones for the design and implementation phases, since most system analysts are focusing on systems rather than users. Even project managers are allocating system requirements to developers, instead of user ones because most requirements specifications are documented by system requirements. Therefore, developers are aware of system requirements only as it can be a big burden to respond to change of user requirements. These being the reasons why there is a communication gap between users and developers, it is reasonable to select someone who is responsible for user requirements to keep or respond quickly to change. [27, 28].

Business Analyst (BA) numbers are increasing globally [29]. The growth rate of business analysis jobs is almost 22.1% according to recent research [30]. This indicates that BA has been recognized as a very critical role in many organizations. BA raises project success rates, provides correct solutions aligned with the organization's strategy, and increases competitiveness through effective communication between users and developers [17, 31-35]. The main role of a BA is as a bridge [31] or a change agent [17] in the middle position to identify and manage user requirements. They are responsible for transferring requirements or information of users and developers, facilitating their ideas, and resolving conflicts occurred from decision gaps between them. It means that BAs must speak fluently business and technological language, while having soft skills and positive mindset to make all stakeholders satisfied [17, 33, 36].

In Korea, many finance companies started to setup a business analysis organization. However, they did not stabilize in the organization, because of lack of perception of BA role or of their performance [29]. The BA role may be duplicated by traditional roles, such as project

leader or system analyst. Basically, there are no clear criteria for selecting and developing BAs, thus they are hired without a systemic evaluation process on their performance, experience, knowledge, skills, or attitude [37], and many BAs are working on business analysis position without any official assessment of their qualities [38]. This is the reason they do not gain trust from other stakeholders and work as bridges in limited projects.

Based on the background, two research questions were derived:

- RQ1: Which business analysis competencies are of greater importance in selecting BAs?
- RQ2: Is there any importance–perception gap in these competencies between stakeholders?

This study can be useful to researchers, project managers, human resource development (HRD) specialists, education instructors, BA managers, and BA practitioners in identifying relevant competencies enabling efficient BAs in information system development.

2. Literature Reviews

2.1 Competency

According to the Oxford Dictionary, competency (or competence) is defined as the "ability to do something" or the "ability for a work [39]." McClelland first proposed the concept of competency in 1973. He proved that school grades have no real power in predicting competency in real life outcomes and argued that a test should be designed to reflect changes in what people have learned. He asserted that it is meaningless to find a characteristic that cannot be changed by training or experience in his paper [40]. Subsequently, the concept of competency has been developed over decades. In 1982, Boyatzis [41] mentioned that competencies are composed of the motivation, skills, self-image, social roles or knowledge needed for successful job performance. In 1989, Jacobs [42] defined that competencies as observable skills and abilities required to successfully complete the job performance. According to Gonczi and Hager's 1990 paper, competent experts are defined as those who have the necessary attributes for the appropriate qualities of job performance; competencies are attributes such as knowledge, abilities, skills and attitudes, the performance of a role or tasks, and the standard to evaluate and verify the performance and capabilities for the roles and tasks [43]. In 1993, Spencer and Spencer defined competencies as underlying characteristics of better performers, such as motives, traits, self-concepts, knowledge, and skills [44]. Meanwhile, Strebler, in 1997, stated that the definition of competency is related to a competency framework that is composed of two models relating to the "underlying characteristics of a superior individual" and "the ability to perform tasks to a prescribed standard," which are expressed, assessed, and measured as competencies. Therefore, he expressed competencies as individual behaviors and minimum standards of competent performance [45]. Hoffman, in 1999, derived the definition of competency from output competencies of the concept of "competent performance" that can be the result of education, and from input competencies of the concept of "underlying attributes of a personal" that an individual needs to achieve competent performance [46], through a literature review and by using the human performance model of Rummler [47].

Competencies may provide a guideline for evaluating resources that are excellent in work performance and can be used for developing education programs for improving competencies

when required [37, 46, 48]. There is the advantage that competencies may protect from personal bias on human resource capability through the same standard [44]. Competencies must be developed continuously through experience, education and training, supported for better work performance and meeting goals, strategies, and missions of the organization to be changed [49-52]. However, if the tasks are more complex, output competencies can be difficult to measure, because output competencies must be composed of common or broad tasks [46, 49]. Input competencies, such as characters, motives, traits, intelligence, and mental attributes, are also difficult to develop through education and training [46], except knowledge and skills.

2.2 Business Analysis

An information systems development environment is composed of problem areas and solution areas [27]. The guide to the business analysis body of knowledge (BABOK) [17] of the International Institute of Business Analysis (IIBA), established in 2003, defines the concept of business analysis as activities needed in the middle between the problem area and the solution area. The problem area refers to the current business environment problems, and the solution area refers to the future development environment solutions [31]. BABOK [17] defines business analysis in detail as the practice to facilitate organizational change, provide justification of change and designs, and describe valuable solutions. Blais [31] also wrote that business analysis is all about change, such as business process changes, information system changes or organizational changes.

The BA is responsible for business analysis with professional knowledge and skills. BABOK [17] defines the BA as a person who tries to solve the problems of users and recommends the solution to them. Ruben [33] mentions that a BA manages user requirements, manages the relationship among members, facilitates creative ideas of members, and supports implementations for successful projects at the high level of the organization, within broad areas in information systems development environment.

2.3 Business Analysis Competencies

The IIBA provides a total of 53 performance competencies and 20 underlying competencies through the Business Analysis Competency Model version 3.0 [53] which is based on BABOK version 2.0 and a total of 29 underlying competencies in BABOK version 3.0 [17]. The performance competencies are categorized in six BABOK knowledge areas and the underlying ones are categorized in six competency dimensions. In 2011, Blais [31] mentioned that BAs needs not only abilities, but also the combination of left brain and right brain. That means BAs must have technical knowledge and skills as well as the sense of human relationships to be successful in their role. He provides nine individual business analysis competencies needed for all BAs who have different attributes, such as experience, knowledge, skills, and characters. Davis, in 2013, [37] defined competency as “a set of behaviors providing a guide to identify, evaluate and develop behaviors of employees.” He created a competency model composed of knowledge and skills to improve the possibility of success in work performance. The competency model is composed of domain knowledge and technical knowledge as knowledge competencies, and business skills, technical skills, and soft skills as skills competencies, that is, the ability to apply knowledge. He provides only underlying competencies, as well. Hass [54] describes necessary skills for BAs in each project phase which is based on the Business Solution Life Cycle (BSLC) Model by differentiating skills in the life cycle by soft skills and technical skills. He also provides only underlying competencies. Wiegers [20] mentions that BAs cannot analyze businesses effectively without enough

training, guidance, and experience. For effective business analysis, BAs must have competencies in communication, facilitation, interpersonal relationships, business domain, and information technology; therefore, he provides a total of 14 soft skills and 5 knowledge competencies. Jami Cooke [38] argues that most of business analysis education programs are generally based on a waterfall approach rather than an agile approach. He asserts that education programs on business analysis based on the agile approach must be developed, and provides underlying competencies for success in an agile project that focuses on knowledge and skills. Jonasson [32] emphasizes on defining competences in terms of business analysis rather than in term of general skills. He provides two knowledge and five skills as the main underlying competencies for business analysis. Sonteya [55] describes tasks and identifies competencies of business process analysts thorough expert interviews based on the pyramid competency model [56]. He provides underlying competencies of business project analysts, in terms of knowledge, skills, and attitude. Paul [57] mentions that a good BA must recognized the justification of investment to improve business and information technology environment. He provides behavior skills, business knowledge, and techniques as competencies required for business analysis.

Most studies mentioned only individual underlying competencies of input competencies, except for the IIBA's BA competency model that includes both performance and underlying competencies. It is difficult to set up general and broad tasks in business analysis which are adaptable in all kinds of business domains, industry types, project types, and BA maturity levels, even though the IIBA provides the BABOK guide on business analysis knowledge areas and tasks. Therefore, in this paper will focus on underlying competencies in order to find the relative importance among them. The literature review yielded 6 competency dimensions and 30 competencies, listed in

Table 1 and used in this paper.

Table 1. Business analysis competencies

Area	Competency	Description	Literature
Attitude	Accountability	Ability to complete tasks as planned to achieve targets and goals.	[17]
	Adaptability	Ability to change techniques, style, methods, and approach.	[17, 38]
	Ethics	Ability to recognize when a proposed solution may present ethical difficulties to an organization	[17]
	Time Management	Ability to prioritize tasks, perform efficiently, and effectively manage time.	[17]
	Trustworthiness	Ability to build trustworthy relationships with stakeholders.	[17, 38, 55, 57]
Knowledge	Business Acumen	Ability to understand fundamental business principles and best practices to ensure that they are considered as solutions.	[17, 32, 37, 38, 54, 55, 57]
	Domain Knowledge	Ability to understand a specific business domain or sector, which is different from the general domain.	[17, 20, 31, 37, 54, 55, 57]
	Methodology Knowledge	Ability to understand the methodologies that provides the timing, the approach, and other aspects of how a change is managed.	[17, 20, 31, 37, 38, 54, 55, 57]
	Organization Knowledge	Ability to understand the organization's formal and informal communication channels as well as an awareness of the internal politics.	[17, 20, 54, 55, 57]

	Solution Knowledge	Ability to understand commercially available solutions or suppliers, such as Big Data, CRM, ERP, SCM, POS, BI, DW, etc.	[17, 20, 31, 32, 37, 38, 54, 55, 57]
	Technical Knowledge	Ability to understand how systems are developed, how data is stored and retrieved, how systems are designed.	[32, 37, 38, 57]
Analysis	Root Cause Analysis	Ability to analyze root cause in order to solve a problem in implementing a solution for stakeholders and enterprises	[17, 31, 32, 37, 54, 57]
	Structured Analysis	Ability to take abstract concepts, complex scenarios, and disjointed customer wishes and transform them into a structured document.	[20, 31, 32, 54, 57]
	Decision Making	Ability to understand decision-making criteria and assist others in better decision-making.	[17, 54]
	Statistical Analysis	Ability to interpret surveys or gather data from users for process improvement.	[55]
Thinking	Client Experience Thinking	Ability to focus on the client's experience of a business process	[55]
	Conceptual Thinking	Ability to understand the relationship among contexts, solutions, needs, changes, stakeholders, and value in the larger picture.	[17, 32, 38]
	Creative Thinking	Ability to generate new ideas, approaches, and alternatives for problem solving and generating opportunities.	[17, 20, 37, 38]
	Learning	Ability to quickly absorb new and different types of information and also modify and adapt existing knowledge	[17, 20]
	System Thinking	Ability to understand the interaction between people, processes, and technology within an organization.	[17, 20, 38, 55]
Communication	Listening	Ability to listen and interpret what the other person is trying to communicate beyond the words used in order to understand the essence of the message.	[17, 20, 37]
	Non-Verbal Communication	Ability to effectively send and receive messages through body language, posture, facial expressions, gestures, and eye contact.	[17]
	Verbal Communication	Ability to use spoken words to convey information such as business analysis information, ideas, concepts, and opinions.	[17, 20, 31, 32, 37, 38, 54, 57]
	Written Communication	Ability to convey ideas, concepts, facts, and opinions to variety of stakeholders using text, symbols, models, and sketches.	[17, 31, 38, 54]
Interaction	Conflict Resolution	Ability to resolve conflicts of opinion among stakeholders and team members.	[17, 32, 37, 38, 54]
	Facilitation	Ability to facilitate and moderate meetings or workshops.	[17, 20, 31, 32, 37, 54, 55, 57]
	Leadership	Ability to influence a group of stakeholders in a certain direction to accomplish a common goal.	[17, 20, 32, 37, 55, 57]
	Questioning/ Interviewing	Ability to ask the right questions and curiosity to dig deeper.	[20, 31, 32, 37, 38, 55]
	Relationship	Ability to work with team members in a	[17, 20, 31, 37,

	Building	positive and trustworthy team dynamic to develop and implement solutions.	38, 54, 57]
	Teaching	Ability to clarify context and educate stakeholders regarding the value of their needs.	[17, 38, 54]

2.4 Analytical Hierarchy Process

The analytical hierarchy process (AHP), developed in the 1970s by Thomas L. Saaty [58], is a multi-criteria decision-making approach based on mathematics and psychology. The AHP is used to support multiple decision targets, multiple assessment criteria, or mutually exclusive alternatives. For the AHP, the complex situation should be broken down into components (or variables) to build a hierarchical framework, based on which it can measure the weights of importance of each component [59]. The AHP is a systematic approach in which the evaluation of the lower layer can estimate the effect delivered to the upper layer to objectify the subjective judgment of the expert determining a weight based on a pair-wise comparison between the components.

Studies using the AHP generally measure the value of alternatives or their priority. This technique is utilized frequently because it can extract consistent weights of importance or the value of variables using a simple pair-wise comparison [60]. It also allows to integrate different measures into a single and overall weight score for the weights and ranks of BA competencies [58, 61]. This approach could be valuable in developing competency criteria for BA selection and development. Many studies use the AHP to underline the importance of competency.

In project management research, the AHP is used for establishing relative importance of competencies for project management officers and information system auditors [62, 63]. In the service industry, this method is utilized for the relative importance of competencies of senior management [64]. In manufacturing research, it is used to measure the weights and priorities of technical managers' competencies, evaluation of suppliers, or procurement performance [65-67]. Monica Hu [68] considers that the impact of competencies that are not considered can be greater than competencies that are considered and impact on work performance from harmful wrong decisions. As such, data analysis about importance and priority of competencies using the AHP is very useful for organizations.

3. Research Methodology

The main research method used was an expert interview for data gathering and the AHP for data analysis. To increase the consistency and reliability of the data, they were collected through expert interviews that focused on gathering both quantitative and qualitative data. The former was obtained for measuring relatively importance weights, and the latter for analyzing why the competency is more important than others in total and in each competency dimension.

3.1 Research Participants

In this research, research participants are experts who have sufficient knowledge about information systems development environment. A total of 12 experts were interviewed by the guideline [69, 70] that at least 7-8 or more experts must participate. These experts are working at information systems companies or projects for more than 20 years and have business analysis activities. To bridge the gap between stakeholders, six managers and six analysts, and three buyers and three sellers for each manager and analyst are selected.

Table 2 presents the profiles of the experts participating in the interview.

Table 2. Demographic information of participants

Number	Gender	Role	Industry	Job Type	Position	Work Experience
1	Male	PM	Internet	Manager	Seller	22 years
2	Male	PI Team Leader	Insurance	Manager	Buyer	15 years
3	Male	PM Team Leader	Public	Manager	Seller	22 years
4	Male	IS Team Leader	Insurance	Manager	Buyer	22 years
5	Male	PM	Bank	Manager	Seller	22 years
6	Male	IS Team Leader	Insurance	Manager	Buyer	21 years
7	Male	Process Consultant	Public	Analyst	Seller	22 years
8	Female	ISP Leader	Air	Analyst	Buyer	19 years
9	Male	BA Specialist	Insurance	Analyst	Seller	22 years
10	Male	BA Specialist	Insurance	Analyst	Buyer	15 years
11	Male	BA Specialist	Military	Analyst	Seller	30 years
12	Male	BA/IS Leader	Medical	Analyst	Buyer	26 years

3.2 Data Analysis

The analysis of quantitative data is done in 5 steps as per the AHP guideline by Saaty [58].

Step 1: Building a hierarchy framework.

First, we place the objective of this research on the top of the hierarchy. Second, we place the competency dimensions. Finally, we place individual competencies on the level below each competency dimension. Saaty insists that the number of components on each level must be less than nine. **Fig. 1** is the final hierarchy framework of business analysis competencies based the AHP analysis.

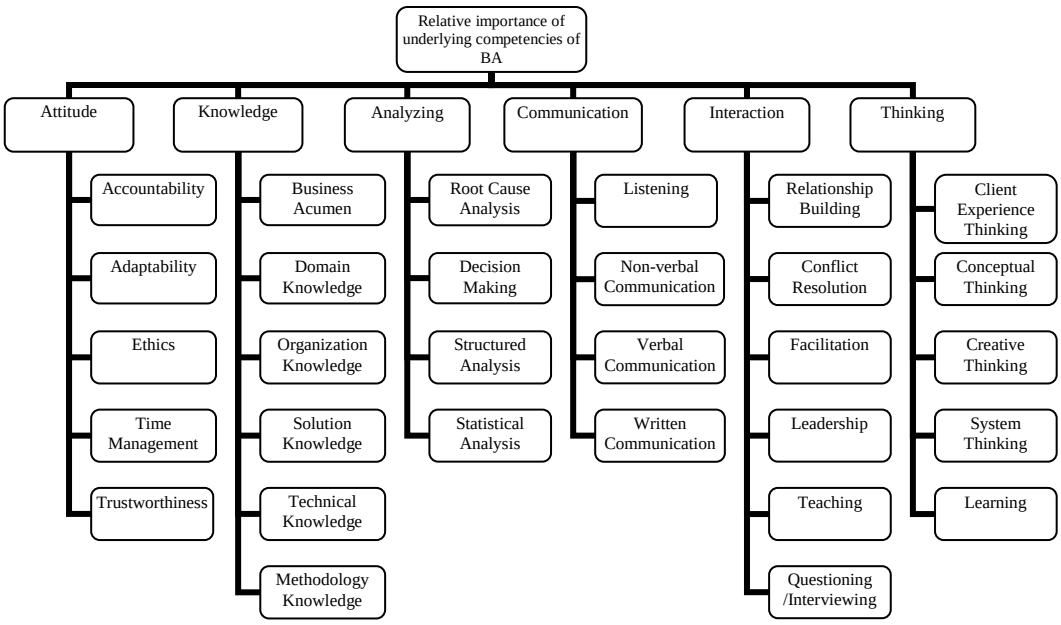

Fig. 1. Hierarchy framework of business analysis competencies

Step 2: Creating a pair-wise comparison matrix for each competency dimension and each competency

After building the hierarchy framework of business analysis competencies, we create the pair-wise comparison tables for each competency dimension to be used in the expert interviews. A 9-point scale (
Table 3) is used to decide the level of the relative importance for pair-wise comparison. For example, if facilitation competency is somewhat more important than leadership, interviewees can mark the box below 3, which is close to the direction of facilitation competency on the response table (
Table 4). Subsequently, the result is moved into pair-wise comparison matrix like
Table 5.

Table 3. Pair-wise comparison scale

Numerical rating	Definition
1	Equal importance
3	Somewhat more importance
5	Much more importance
7	Very much more importance
9	Absolutely more importance

Table 4. Pair-wise comparison response table

Facilitation	A ←----- More Important -----→ B									Leadership
	9	7	5	3	1	3	5	7	9	
				X						

Table 5. Pair-wise comparison matrix

	Facilitation	Leadership
Facilitation	1	3
Leadership	1/3	1

Step 3: Calculating the relative importance weight of each competency dimension and each competency.

After creating pair-wise comparison matrixes for each interviewee, the value of relative importance weight is calculated, using eigenvalues and eigenvectors. shows the relative importance weights in two competencies with an example in Step 2.

Table 6. Relative importance weights

	Facilitation	Leadership	Weight
Facilitation	1	3	0.7500
Leadership	1/3	1	0.2500

Step 4: Validating the consistency of the data gathered.

After calculating the relative importance weight, the consistency of the data gathered from experts must be validated through the consistency ratio formula. Saaty [58] mentions that if the consistency ratio is under 0.1, then it is reasonable and if it is under 0.2, it is acceptable. If the consistency ratio is over 0.2, the interview must be repeated, or another expert selected.

Step 5: Calculating the weight of the overall hierarchy.

After calculating the relative weights of all competencies, the relative weight of each competency is multiplied by the relative weight of each competency dimension. The higher score would indicate that it is a more important competency dimension or competency.

4. Research Results and Findings

4.1 BA Competency Dimensions

Table 7 is the results of analyzing the importance of business analysis competencies, using the AHP. The results show that the most important competency dimension is "interaction" with the weight of 0.21523. According to expert interviews, "interaction" is a very important competency, because:

- BA must have a good relationship with cross-functional stakeholders (expert 8).
- BA must catch and integrate scattered information or knowledge around organization (expert 10).
- BA must find out what is in user's mind (expert 7).
- BA must get business knowledge easily, if they have a good relationship. This is useful for a big project (expert 5).

Table 7. Relative weights and ranks of BA competencies

Dimension	Dimension weight	Dimension rank	Underlying competency	Overall weight	Overall rank
Attitude	0.19349	2	Accountability	0.05385	3
			Ethics	0.04568	5
			Trustworthiness	0.04266	9
			Time Management	0.03198	13
			Adaptability	0.01933	25
Knowledge	0.13620	5	Domain Knowledge	0.03838	11
			Business Acumen	0.02990	16
			Organization Knowledge	0.02840	19
			Solution Knowledge	0.01751	26
			Methodology Knowledge	0.01309	29
			Technical Knowledge	0.00892	30
Analysis	0.15360	4	Root Cause Analysis	0.07299	1
			Decision Making	0.03466	12
			Structured Analysis	0.02471	22
			Statistical Analysis	0.02124	23
Communication	0.16603	3	Listening	0.06684	2
			Written	0.04524	6

Dimension	Dimension weight	Dimension rank	Underlying competency	Overall weight	Overall rank
			Verbal	0.04035	10
			Non-Verbal	0.01360	28
Interaction	0.21523	1	Leadership	0.05335	4
			Conflict Resolution	0.04509	7
			Relationship Building	0.03137	14
			Facilitation	0.02999	15
			Questioning	0.02907	17
			Teaching	0.02636	21
Thinking	0.13546	6	System Thinking	0.04490	8
			Conceptual Thinking	0.02886	18
			Client Experience Thinking	0.02666	20
			Creative Thinking	0.02118	24
			Learning	0.01385	27

The results show the next important competency dimension is "attitude" with the weight of 0.19349. During interview, many experts said that attitude is a very important competency for BA, because:

- BA's bad attitude can affect all other competencies (expert 11).
- BA cannot be trusted by users. Even though other competencies are perfect, it is impossible to work normally (expert 12).
- BA's negative attitude creates difficulties in the project (expert 1).
- BA cannot obtain results without a positive attitude toward meeting user goals (expert 7).
- BA must have the active and positive attitude with a top priority, try to learn, and appreciate working together (expert 9).
- BA does not have to act arrogantly (expert 5).

4.1.1 Attitude Dimension

The results show that "accountability" competency has the weight of 0.05385, which is the highest in the "attitude" area, and the third in all business analysis competencies, because:

- BA must recognize that meeting the goal is very important (expert 2, 6).
- BA recognizes the priority of requirements and tries to cover low level of knowledge or skills (expert 1).
- "Accountability" cannot be controlled; however, training or leadership can control other attitude competencies.

The remaining competencies were important in the following order: "ethic," "trust," "time management," and "change adaptable," because:

- Ethical issues may jeopardize the organization (expert 3).
- They must be transparent and fair without conflict of interests for right solutions (expert 9).
- The organization may be ruined due to dishonest results. It is only momentary (expert 7, 10, 11).
- Issues or problems cannot be resolved without trust (expert 8).
- "Trust" can get cooperation easily, even though delays can occur, because of expectation of better outcomes (expert 12).
- "Time management" affects other competencies positively (expert 5).

4.1.2 Knowledge Dimension

The results show that "domain knowledge" competency has the weight of 0.03838, which is relatively the highest importance in the "knowledge" area and 11th in all business analysis competencies because:

- The basic objective of information systems is to ensure organization performance (expert 3).
- It is a basic competency for analyzing requirements. Without "domain knowledge," it is impossible to have an interview with users and to make decision about the solution users want (experts 2, 6).
- It is impossible to align business requirements with lack of domain knowledge (expert 4).
- "Communication" with users is more important than with developers (expert 9).
- Few technical "communication" are required if the system is based on the technical framework (expert 2).

The remaining competencies were important in the following order: "business acumen," "organization knowledge," "solution knowledge," "methodology knowledge," and "technology knowledge," because:

- Prior to "domain knowledge," it is important to gain basic business knowledge (expert 3).
- Prior to knowing business rules, it is important to know business strategies (expert 7).
- BA needs to understand the organization goal and structure to find out appropriate and effective solutions (expert 12).
- BA can provide advance solutions to users with deep "solution knowledge" (expert 7).
- BAs do not have to have deep "methodology or technology knowledge," they need only the ability to follow them (expert 5).
- BA can obtain "technical knowledge" from other specialists (expert 11).

4.1.3 Analysis Dimension

The results show that "root cause analysis" competency has the weight of 0.07299, which is the highest in "analysis" area and the highest in all business analysis competencies, because:

- BA is a person who provides the solution to solve the user problems. Generally, users do not mention the root cause, because they may not know it or they may try to hide it (expert 3).
- BA needs the ability to identify the root cause of a problem that users do not mention (expert 11).
- BA can take a wrong decision, if they do not analyze the root cause (experts 7, 12).
- It is impossible to get a rapid response on business change (expert 2).

The remaining competencies were important in the following order: "decision making," "structured analysis," and "statistics analysis," because:

- The rapid "decision making" can affect the success or failure of a project (expert 1).
- The progress of a project depends on the "decision making." A delayed decision about an issue can delay the project (expert 5).
- "Structured analysis" is one good technique to reduce the uncertainty of requirements (expert 9).

- Nowadays, big data is a hot business technology to increase the business competitiveness with technology. There, the BA must have "mathematic or statistics analysis" competencies (expert 6).
- However, "root cause analysis" is number one. "Structured analysis" or "statistics analysis" are supporting tools for decision making (expert 3).

4.1.4 Communication Dimension

The results show that "listening" competency has the weight of 0.06684, which is the highest in "communication" area, and the second highest in all business analysis competencies, because:

- "Listening" is the start point of communication and the beginning step of business analysis (expert 4).
- Usually, people do not listen (expert 6).
- BA needs to listen to users to understand their problems and provide the right solution, which is the BA's role (expert 2).
- BA needs to gain an insight from user feedback; reading documents for problem solution is insufficient (expert 7).
- Many individuals lack listening skills (expert 3).
- Many individuals are smug (expert 8).
- Listening indicates respect and is a basic attitude and skill for obtaining trust. (expert 12)

The remaining competencies were important in the following order: "writing," "verbal," and "non-verbal" because:

- If BA has good "writing" skills, people can increase the collaboration, decide, and share more information. "Verbal" information can easily disappear. "Writing" can protect "verbal" (expert 1).
- Even though there are many "verbal communications," the results of communication can be shares through documents (expert 11).
- Nowadays, "non-verbal communication" is increasing, because of on-line communication tools (expert 5).

4.1.5 Interaction Dimension

The results show that "leadership" competency has the weight of 0.05335, which is the highest in "interaction" area and the fourth in all business analysis competencies, because:

- BA needs to provide direction to others (expert 5).
- BA needs to lead users in the right direction (expert 7).
- There are many stakeholders in business analysis. BA needs to influence others for effective business analysis (expert 1).
- Most of stakeholders think only about themselves, thus BA needs to have "leadership" competency to meet the organization goal with them (expert 8).
- Increasing other competencies is a basic competency (expert 6).

The remaining competencies were important in the following order: "conflict resolution," "relationship management," "facilitation," "questioning/ interviewing," and "teaching," because:

- There are numerous conflicts over user requirements, system open schedule or resource limitations, etc. The BA needs to negotiate with and persuade stakeholders (expert 2).
- Conflicts can affect teamwork (expert 12).
- Good relationship with stakeholders improves business analysis performance (expert 3).
- Teamwork and collaboration is the driving force of an organization. The BA's relationship competencies affect stakeholder attitudes (expert 4).
- "Interviewing" competency can elicit user requirements in a short time (expert 9).

4.1.6 Thinking Dimension

The results show that "system thinking" competency has the weight of 0.04490, which is the highest weight in "thinking" area and the eight highest in all business analysis competencies, because:

- BA needs the ability to transform complex situations into simple ones to be analyzed (expert 5).
- The BA must be able to see the entire business or system (expert 11).
- Logical thinking is very important for solving user problems (expert 7).

The remaining competencies were analyzed to be important in the order of "conceptual thinking," "customer experience thinking," "creative thinking," and "learning," because:

- It is important to have a macro perspective rather than a micro one. BA needs to have the future-oriented thinking rather than present-oriented thinking (expert 7).
- Most requirements come from users. Therefore, understanding customer experience is very important (experts 4, 5).
- It is important that users are satisfied with the BA (expert 6).
- For the rapid decision-making or solving problems, new or creative ideas are very important (expert 1).
- "Creative thinking" is very important for the new business, especially in a big project (expert 5).

4.2 Importance-Perception Gap among Stakeholders

4.2.1 Importance-Perception Gap between Manager and Analyst

Table 8 and **Fig. 2** show that there is a difference in the importance weight of business analysis based on the roles of stakeholders. In the group, "knowledge" has a big difference in importance weight between experts whose role is a manager and experts whose role is an analyst. "Knowledge" is the highest for manager, but the lowest for analyst. "Interaction" shows the opposite result. In total, "domain knowledge" has a big difference in importance weight between the role of manager and the role of analyst. It has the highest importance weight for managers, but it has almost the lowest for analysts. "Listening" has also has a big difference in importance weight between roles of manager and analyst. It has the highest importance weight for analyst, but it has almost the lowest for manager.

Table 8. Weights and ranks of BA competencies by stakeholder types

Dimension	Competency	Manager		Analyst		Buyer		Seller	
		Weight	**Rank**	**Weight**	**Rank**	**Weight**	**Rank**	**Weight**	**Rank**
Attitude	Accountability	0.06717	4	0.03207	14	0.03713	9	0.05212	5
	Adaptability	0.01529	25	0.01816	20	0.01112	28	0.03430	12
	Ethics	0.02408	16	0.06439	3	0.03179	13	0.05845	2
	Time Management	0.03675	7	0.02067	17	0.02070	22	0.04399	9
	Trustworthiness	0.02164	20	0.06250	5	0.04263	7	0.05115	6
		0.16492	***2***	***0.19780***	***3***	***0.14338***	***4***	***0.24002***	***1***
Knowledge	Business Acumen	0.08312	2	0.00799	27	0.03200	12	0.02549	18
	Domain	0.13238	1	0.00827	26	0.02375	18	0.05753	4
	Organization	0.06493	5	0.00923	25	0.03083	14	0.02183	25
	Solution	0.03000	12	0.00760	28	0.01344	25	0.01735	27
	Technical	0.02307	17	0.00256	30	0.00758	30	0.00973	30
	Methodology	0.02011	22	0.00633	29	0.00958	29	0.02382	22
		0.35361	***1***	***0.04198***	***6***	***0.11719***	***6***	***0.15576***	***3***
Analysis	Root Cause Analysis	0.07458	3	0.05307	7	0.07634	3	0.06215	1
	Decision Making	0.03260	10	0.02738	16	0.03935	8	0.02264	24
	Structured Analysis	0.02277	19	0.01992	18	0.01903	23	0.02858	15
	Statistical Analysis	0.02590	14	0.01294	24	0.02370	19	0.02397	21
		0.15585	***3***	***0.11331***	***5***	***0.15842***	***3***	***0.13735***	***5***
Communication	Listening	0.03806	6	0.08721	1	0.08707	2	0.04764	8
	Non-Verbal	0.00954	29	0.01439	23	0.01254	26	0.01313	29
	Verbal	0.02288	18	0.05287	8	0.03694	10	0.03447	11
	Written	0.02480	15	0.06134	6	0.04343	6	0.05815	3
		0.09528	***6***	***0.21581***	***2***	***0.17997***	***2***	***0.15340***	***4***
Interaction	Relationship Building	0.02620	13	0.02791	15	0.03451	11	0.02540	19
	Conflict Resolution	0.03273	9	0.04614	10	0.07608	4	0.02380	23
	Facilitation	0.01487	26	0.04492	11	0.02732	17	0.03159	13
	Leadership	0.03351	8	0.06311	4	0.08772	1	0.02711	16
	Teaching	0.01167	28	0.04423	12	0.02211	20	0.02626	17
	Questioning	0.01307	27	0.04804	9	0.02126	21	0.05082	7
		0.13205	***4***	***0.27435***	***1***	***0.26900***	***1***	***0.18497***	***2***
Thinking	Client	0.03120	11	0.01692	21	0.03057	15	0.01579	28
	Conceptual Thinking	0.01891	24	0.03274	13	0.02831	16	0.03028	14
	Creative Thinking	0.01971	23	0.01691	22	0.01757	24	0.02405	20
	System Thinking	0.02131	21	0.07028	2	0.04346	5	0.03964	10
	Learning	0.00716	30	0.01990	19	0.01213	27	0.01874	26
		0.09829	***5***	***0.15676***	***4***	***0.13203***	***5***	***0.12851***	***6***

There are some reasons for these results. Experts who perform the role of manager mentioned:

- Most of managers recognize it is impossible to identify and analyze business problems without business knowledge (experts 2, 3).
- User requirements are always incomplete. Therefore, BA needs to lead users with business knowledge. This can reduce the time of analyzing and trial-and-errors (expert 6).
- Business knowledge is especially important in a big project (expert 5).

Nevertheless, experts who perform the role of analyst mentioned:

- “Interaction” is more important than knowledge (expert 2).

- Good interaction skills make it easy to catch knowledge floating around in an organization. Knowledge is accumulated over time (expert 3).

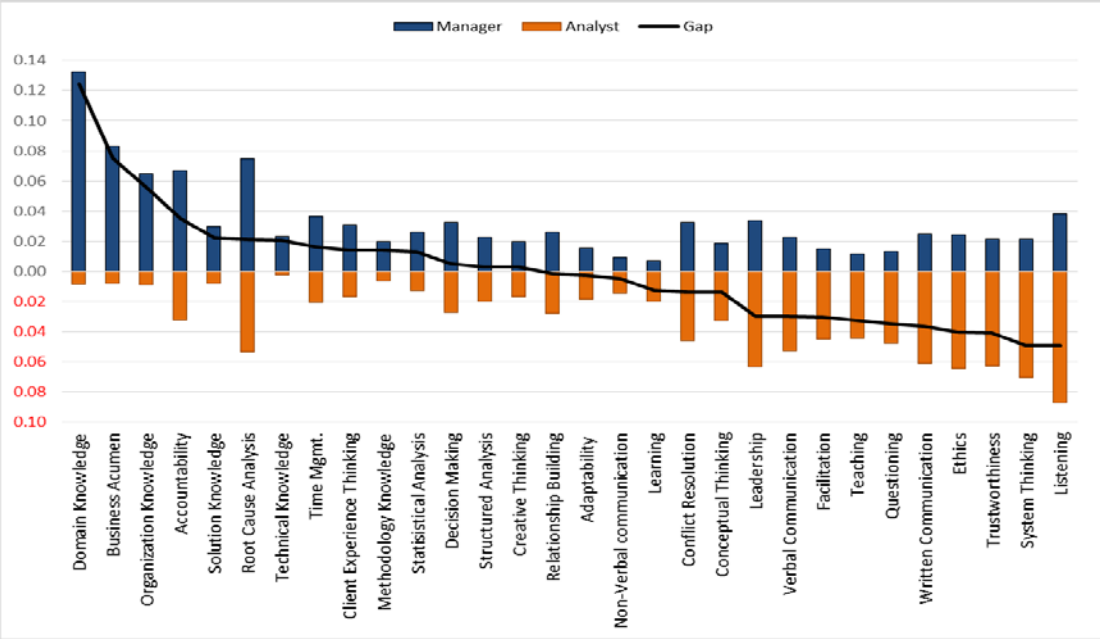

Fig. 2. Importance–perception gaps between manager and analyst

4.2.2 Importance-Perception Gap between Buyer and Seller

Table 8 and **Fig. 3** also show that there is a difference in the importance weight of business analysis based on the roles of stakeholders. In the group, "leadership" has a big difference in importance weight between experts whose role is a buyer and experts whose role is a seller. "Interaction" is the highest for buyer, but the lowest for seller. "Attitude" shows the opposite result. In total, "leadership" has a big difference in importance weight between the role of buyer and the role of seller. It has the highest importance weight for buyer, but it has almost the lowest for seller. "Domain knowledge" has also has big difference in importance weight between the roles of buyer and seller. It has the highest importance weight for seller, but it has almost the lowest for buyer.

These results are explained by experts who perform the buyer's role:

- Building a good relationship with users as a buyer enables an easier identification of user problems (expert 10).
- The BA's main role is resolving conflicts occurred between users and developers (expert 12).
- "Attitude" can be controlled by others, such as project manager or senior manager. As such, "attitude" is less important than other competencies (experts 4, 8, 10).

However, experts who perform the role of seller mentioned:

- Staffing BAs as a seller is not an easy job, when BA has a wrong attitude (experts 1, 7, 9).

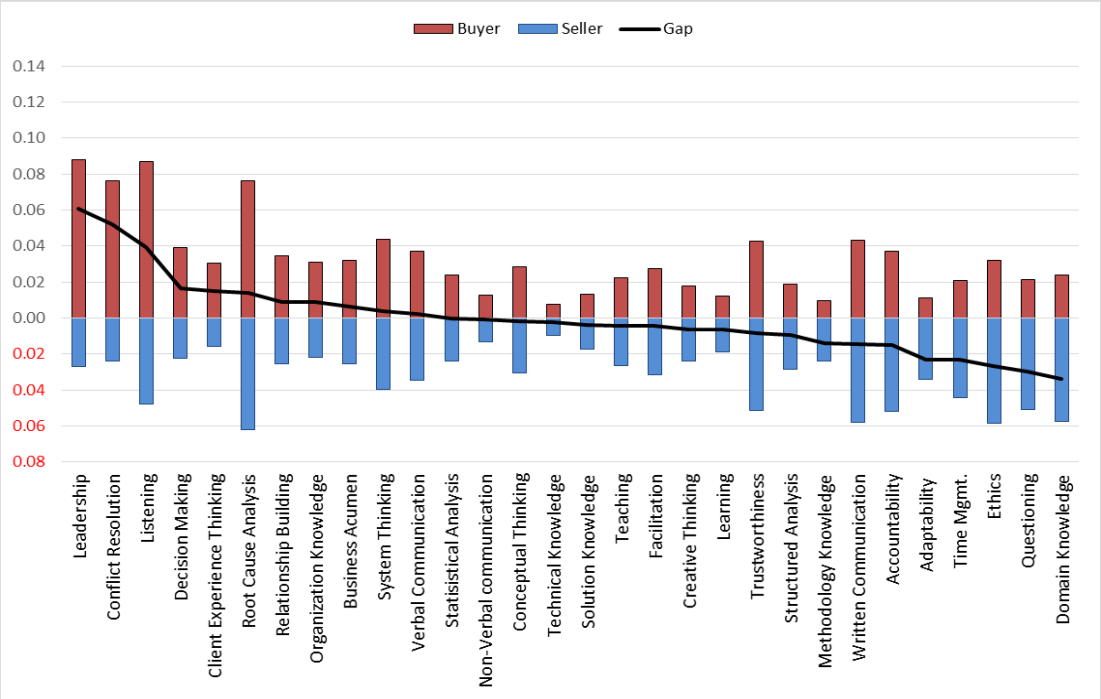

Fig. 3. Importance–perception gaps between buyer and seller

5. Conclusion

Research efforts have contributed insignificantly to business analysis competencies in business and information systems development environment. The objective of this research was to contribute to BA selection and development by analyzing the importance weight and priority of business analysis competencies, identifying a total of 30 business analysis competencies from the literature in terms of underlying competencies, such as knowledge, skills, and attitude. It is based on the contributions of the participants who are experts working on business analysis or project management for more than 20 years in Korea. The participants compared business analysis competencies in pairs and then explained the reason why the business analysis competency is very important. The AHP was used for data analysis. Both literature review and data analysis indicate which competencies BA should have, which competencies are high priority, and how big is the importance-perception gap of business analysis competencies between manager and analyst, and between buyer and seller is. The result of this research will support individuals or organizations who want to select or develop BAs who are responsible for analyzing the problem that users have and providing the solutions they want. Generally, BAs cannot have all competencies to do their job. The relative importance weight and the priority of this research must be useful for human resources departments who need to select BAs and education departments or instructors who need to develop business analysis training programs for them.

The overall result shows that “interaction” with stakeholders is a very important competency for BA, rather than business knowledge or IT knowledge. Research and practice show that the main factor of project failure was the communication gap, which impacts uncertainty of project requirements in information systems development. The bigger the communication gap, the higher the requirements uncertainty is. BA needs to reduce the communication gap.

Consequently, this study implies that BA must be a bridge between users and developers. This result also validates research on the methods to solve communication problems about project requirements [16, 23] and the social relationship between users and analysts to identify early requirements [71].

It is interesting that the importance–perception gap of business analysis competencies among stakeholders was found in this research. The importance–perception gap could be the root cause of the expectation gap occurred between BAs and stakeholders. Most of managers expect that BA must be a problem solver with deep business domain knowledge. However, the opinion of analysts was different from managers. They expect that a BA must be an intermediator with interaction competencies, such as listening, facilitation, and interviewing. Due to the expectation difference about business analysis competencies, the BA role or organization has not been vitalized very well in the organization. This could be the reason that BA job is still unstable in Korea. This research strongly implies that BA must be selected and developed by clear criteria of business analysis competencies. This result also proves the research about the gap between expectation and perceived performance in which with the bigger the gap, user satisfaction will be reduced [16, 72].

Without clear criteria for better selection of BA or better performance of business analysis, many BAs are being allocated to the complex information system development projects. However, the objective of hiring or organizing BAs is to meet the organization's goals and strategies, through successful business oriented information system projects. Even though the results of this study are clear, further research regarding business analysis competencies is necessary. Future research could uncover the co-relationship between the expectation gap of business analysis competencies and the project success or the user satisfaction in business oriented information systems development environment.

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