

Contribution of intellectual abilities to a manager's success: correlation between the results of cognitive ability tests and an assessment center

Abstract

Expanding on previous studies showing correlations of Assessment Centers ratings and cognitive ability tests results, these studies investigated the nature of this relation. Evidence from two samples of managers in Russia shows that the correlation is non-linear and indicates that low-level intellectual abilities adversely affect the effectiveness of a manager's leadership behavior but high-level of intellectual abilities does not result in an increase in effectiveness.

Keywords: assessment center, cognitive ability tests, leadership, competencies, manager performance

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Svetlana I Simonenko

Managing Partner, Detech (Development Technologies Ltd),
Russia

Correspondence: Svetlana I Simonenko, Managing Partner,
Detech (Development Technologies Ltd), Russia, Email
simanenko@detech-group.com

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Introduction

Over the past forty years academic literature has repeatedly debated the attributes that are most important for a manager's success.¹⁻⁷ Countless research performed by independent authors and also major international consulting companies have different lists of key personality characteristics of competencies.⁸⁻¹¹ Even though the lists differ materially, most of them contain such characteristics related to intellectual abilities as the mind, intellect or the analytical skills of the manager. Following the publication of works on transformational leadership and emotional intellect, research into the role played by a manager's intellect in his effectiveness was put on the backburner. Moreover, some authors even called into question whether intellectual abilities have any influence on effectiveness.¹²⁻¹⁵ However, after studying these works, we are forced to admit that until now we have not been able to leverage strong arguments attesting to the leading role of the intellect in a manager's success or the exact opposite owing to a shortfall in experimental findings. To clarify this issue, we performed research to understand the nature of a link between a manager's intellect and success.

Leadership competency model

The theoretical basis for the research derived from foreign methodology stipulating that it is impossible to be an effective manager without being a leader, and vice-versa.^{1,16} In other words, we do not perceive leadership and management to be mutually exclusive, but rather hold them to be identical phenomena. Each company, which has its own organizational cultural specifics, business goals and ways of attaining them, will demand from the manager a specific style of work or leadership, which may differ from what would be considered the desirable style at another company. To determine the style that would be most effective, we should rely on a specific type of leadership. However, any attempt to do this would lead us to conclude that most leadership styles, irrespective of the specific theory, are useful and extremely effective for the management of specific types of subordinates or for the attainment of results in specific business conditions, or at a specific development stage of the organization. If such an approach were to be applied, we would lose sight of the individual image of the organization and would be deprived of the opportunity to "tweak" the list of performance criteria that are so important during the hiring of new employees, promotions and without a doubt personnel development and training. Consequently,

we stress the need to apply an atypical approach to describe leadership behavior that would make it possible to vary the performance criteria depending on organizational specifics. If we take all existing methods for describing leadership, the description of leadership behavior through a set of key competencies seems most appropriate. The competencies differ qualitatively from previous practice of listing personality traits due to the fact that they focus on behavior from the perspective of the external manifestation of these traits, combined with skills and knowledge through the prism of motivational components. The ability to observe the extent of the manifestation of competencies, subject to the existence of a predefined model, makes it possible to assess as objectively as possible their pronounced nature for a specific individual. We name in the competency model a specific list of competencies that are key for successful individual performance in a specific position. When talking about the model for leadership competencies, we have in mind leadership positions at an organization. Consequently, the effective leadership model is a set of competencies that determine the success of the leader in attaining targets within the scope of a specific organizational culture, provided that they are manifested at a sufficient level.¹⁷

Assessment center and cognitive ability tests

Assessment Center (AC) is a method where we can observe real behavior of a person in job related situations and assesses his/her competencies. There is quite extensive evidence that AC ratings relate with job performance which allows us to use AC as a predictor of managerial efficiency.^{18,19} At the same time, research shows that ability tests can be used as predictors too. This is especially true for managerial and leadership positions where the person has to make complex decisions and take responsibility. The higher is the complexity and intellectual challenge of the job the more is the relation between tests results and actual performance.⁷ The interrelation between the results of the AC and the cognitive ability tests has often been the subject of research.^{20,21} Unfortunately, most of these studies are based on the assessment of entry-level personnel or using meta-analysis.²²⁻²⁴ And only a few studies were conducted on the sample of managers, and very rarely top management assessment results are used.²⁵⁻²⁷ This study is intended to add data on the presence of correlations between the results of the AC and the cognitive ability tests and shed light on the nature of the connection between the level of intelligence of the manager and its his/her effectiveness. In addition, all data is

collected on a sample of Russian top and middle managers, which are a fairly important part of the organization. Further, we will present two studies on the samples of top managers and middle managers in different organizations of Russia. Hypothesis 1. There is a significant correlation between cognitive abilities test results and an overall rating of the AC. The higher is a leader's intelligence, the higher rating of competencies he will get.

Study I: Methodology

In this study we assessed the leadership competencies of 211 top managers from three major Russian companies in different business sectors – petrochemicals industry, metallurgy and retail trade. In all we assessed 32 women and 179 men. The age of the participants fluctuated from 27 to 62 years. All the participants were assessed using methods designed by the Assessment Center and cognitive ability tests. To assess intellectual abilities of the managers we used two tests: verbal reasoning and numerical reasoning tests which were designed to assess candidates for senior management positions and also specialists participating in the development of strategic solutions. Leadership effectiveness was assessed on the basis of predefined models of an effective leader, representing a list of competencies that is unique for each company. In order to determine the specific behavior that should be demonstrated by an effective leader, we analyzed at the organization the work for the position of a high-level manager, identified the company's strategic goals, identified the methods for achieving these goals, as well as the actions that would be required from leaders to attain them. The external environment was also analyzed (social, environmental, economic and political factors). To assess these competencies, the managers participated in an Assessment Center. Exercises were selected for the Assessment Centers to facilitate the assessment of each competency as a minimum through two different methods. Consequently, in order to assess the competency models, each company used its own set of exercises. In all four to five exercises were used at the Assessment Centers. In the exercises the managers had to carry out the following tasks: hold a group discussion, simulate a conversation with a subordinate, simulate a conversation with a client, analyze business scenarios on the basis of submitted information and take a decision, collect information on the problem and take a decision within specific time constraints. In certain Assessment Centers competency-based

interviews were also used. Competency-based interviews are a special type of structured interview aimed at identifying behavioral traits from the experience of the respondent, which make it possible to assess his/her competencies. Each competency was assessed on a five-point scale presented in Table 1. Observers with at least three years of experience of delivering Assessment Centers certified according to the standard of the British company A&DC in accordance with the recommendations of the British Psychological Society participated in the project. The competency assessments were compiled based on the results of each exercise pursuant to the assessment matrix (Table 2); subsequently overall competency assessments were identified during the Integral Session. The Integral Session is a special procedure involving a discussion of the assessment results by all the observers. Each observer announces assessments compiled based on the results of the exercises conducted at the Assessment Center. This is followed by a group discussion of these assessments, with detailed examples and arguments backing the proposed assessment. The goal of the Integral Session is to compile assessments on all the participants that have been agreed with all the observers.

Table 1 Development level of competencies in behavioral traits

Rating	Level	Description
5	Excellent	Behavioral traits that fully comply with all the necessary positive indicators can be observed.
4	Good	Behavioral traits that comply with the maximum manifestation of more than half the necessary positive indicators can be observed.
3	Adequately	Behavioral traits relating to positive indicators are combined with separate negative manifestations.
2	Inadequately	The demonstrated behavior is below the adequate level for the majority of the positive indicators. More negative indicators are demonstrated than positive indicators.
1	Bad	The demonstrated behavior is below the adequate level for all positive indicators. There are few positive manifestations are very few or none at all.

Table 2 Example of the competency assessment matrix. Study I

Competency	Group discussion	Role play with subordinate	Role play with client	Analytical Presentation	Fact Finding	Competency-based interviews
Focus on results	Core	Core	Core	Core	Core	Core
Interaction with others	Core	Core	Core	Additional	Additional	Core
Liability	Core	Core	Core	Core	Core	Core
People Management	Core	Core	Core	Core	Core	Core
Willingness to Change	Core	Core	Core	Core	Core	Core
Strategic Vision	Core	Core	Core	Core	Core	Core

Legend:

- The competency is assessed as a core competency
- The competency is assessed as an additional competency
- This competency was not assessed

Results of the study I

Based on the results of the assessments we received the following data:

1. Individual manager assessment on each competency obtained during the AC and expressed in ratings from 1 to 5
2. Test results on the numerical and verbal tests expressed in T-scores (standard scale applied in psychometrics) from 20 to 80.

Pearson's chi-squared test has been used to determine whether there is a correlation between intellectual abilities and managerial success. We looked for the correlation between average scores on competencies obtained during the AC and the results of ability tests represented as the total of the T-scores for the two cognitive ability tests. The average score on competencies was used because each of the companies had a different number of competencies in the framework. Statistical analysis identified a stable link between the results of ability tests and competency ratings. At the same time, however, it is clear that this link is fairly weak ($r=0,2$; $n=211$; $p\leq 0,01$). These results do not allow us to unambiguously confirm that our Hypothesis 1 about a relation between intellectual abilities of managers and their success as leaders is proved right. Therefore, we raised a question about the nature of the relation. In order to break down the specific contribution played by intellectual abilities in a leader's effectiveness, we divided the results of the ability tests of all the respondents into five groups. The breakdown of managers by these groups is presented in Table 3. We combined the population into two clusters based on the ability tests results. The first cluster is represented by scores from low to average - in other words, it includes the groups 5, 4 and 3. We named it the "Low-Average Group" (LAG). The second cluster is represented by scores from average to high - it includes the groups 3, 2 and 1. Subsequently we refer to it as the "High-Average Group" (HAG). Our assumption would be confirmed statistically by the following result: the link between the test results and the assessment of competencies would weaken in the Low-Average Group. However, after removing from the calculations the top two groups based on the results of the tests, contrary to our expectations, the correlation ratio increased to 0.310, while the significance level remained at 0.01 ($r=0.310$; $n=144$; $p\leq 0.01$). Such dynamics in the change in correlations attest to the fact that high-level intellectual abilities are not a defining factor for a manager's success. On the contrary, we observe that the inclusion in the sampling of managers from high-performing groups and above average groups weakens the link between the intellect and the assessment of competencies. After repeating the same procedure for the calculations in the Average-High Group, we did not receive any correlations ($r=0.056$; $n=126$; $p\leq 0.5$) (Table 4). Consequently, we can see that the link between the intellect and the assessment of competencies strengthens when we consider groups with average and low results in the ability tests and disappears when we consider groups with average and high results.

Study 2 Methodology and results

In this study we took the results of assessment of 112 top and middle managers of one Russian company in service sphere. 20 women and 92 men in the age from 27 to 63 years were assessed. As in the Study 1 all the managers participated one-day AC and completed numerical and verbal reasoning tests.

The following competencies were assessed in the AC:

1. Responsibility for result
2. System thinking
3. Influence
4. Building relationships
5. Innovation
6. Planning and organizing
7. Quality orientation
8. Leadership

Table 3 Breakdown of managers by groups based on the results of the ability tests. Study I

Group No.	Value of the score	Total of the T-scores	Number of people
1	High	From 133 to 120	22
2	Above average	From 119 to 106	45
3	Average	From 105 to 91	59
4	Below average	From 91 to 78	57
5	Low	From 77 to 64	28

Table 4 Comparison of the correlation ratios of the results of the competency assessments and the tests, net of groups with high scores and groups with low scores based on the ability tests. Study I

	All	Low-Average Group	High-Average Group
Pearson Correlation: Average score on competencies/Aggregate T-score	0,200	0.310	0.056
Significance level	0,01	0.01	0.5
Number of respondents	211	144	126

The AC was conducted in the same methodology as the AC in the Study 1 and the following simulations were used: assigned role group discussion, analytical presentation, roleplay with subordinate and competency-based interview (Table 5). We used Pearson's r to identify if there is a correlation between the managers' success and intellect. Aggregate ratings on competencies obtained during the AC were compared against the results of ability tests represented as the total of the T-scores for the two ability tests. In this case participants were divided into three groups: all participants, participants with the average and higher cognitive tests results (Higher-Average Group), participants with average and lower cognitive tests results (Lower-Average Group). The results of the analysis are in the Table 6. As it is seen, we obtained similar the results as in Study 1 that the link between the intellect and the assessment of competencies enhanced when we consider groups with average and low results in the ability tests and disappears when we consider groups with average and high results. However, there is a difference in the correlation value

between the tests and AC in the whole group is much higher than in the previous study. This can be explained by the fact that people with low tests results prevailed in this group, therefore, the differentiation

turned out to be much more significant. The distribution of people by test results can be seen in Table 7.

Table 5 Competency assessment matrix. Study 2

	AR Group discussion	Role play with a subordinate	Analytical presentation	Competency- based interview
Responsibility for result				
System thinking				
Influence				
Building relationships				
Innovation				
Planning and organizing				
Quality orientation				
Leadership				
Legend:				
	The competency is assessed as a core competency			
	The competency is assessed as an additional competency			
	This competency was not assessed			

Table 6 Comparison of the correlation ratios of the results of the competency assessments and the tests, net of groups with high scores and groups with low scores based on the ability tests. Study 2

	All	Low-Average Group	High- Average Group
Pearson Correlation: Aggregate rating based on the 8 competencies / Aggregate T-score	0,55	0,51	0,15
Significance level	0,01	0,01	0,28
Number of respondents	112	93	54

Table 7 Breakdown of managers by groups based on the results of the ability tests. Study 1

Group No.	Value of the score	Total of the T-scores	Number of people
1	High	From 133 to 120	1
2	Above average	From 119 to 106	18
3	Average	From 105 to 91	35
4	Below average	From 91 to 78	23
5	Low	From 77 to 64	35

Discussion of the results

Such data allows us to conclude that there is clearly a correlation between human intellect and an individual's effectiveness as manager. However, it is non-linear in nature and indicates that low-level intellectual abilities adversely affect the effectiveness of a manager's leadership behavior. Furthermore, this influence is so important that we can consider the ability tests as an indicator of the existence of leadership potential and build forecasts regarding the success of a specific individual as a leader. Furthermore, a high development level of intellectual abilities does not result in an increase in leadership effectiveness, and does not increase the likelihood that the owners of such abilities will be more successful than managers who possess average levels of intellect. Consequently, we are entitled to assert that the intellect makes a material contribution to the effectiveness of leadership and may be recognized as a universal quality that is required by a leader. At the same time, however, the level of intellect required by a leader should be no lower than average, which is determined from the perspective of statistics in standard scores in an interval from 40 to 60 T-scores or from the 16th to 84th percentile (the percentile is rounded up). However, to differentiate the results even further, the group of "average" values in our research was represented by a narrower interval from 45 to 55 T-scores (from the 31st to 69th percentile). Consequently, the general statistical norm that is lower than average correlates with the experimental group of "low scores", while the results of the group "lower than average" are located in the interval from 40 to 45 T-scores or from the 16th to 30th percentile. The groups of "above average" scores are distributed in analogous fashion (from 55 to 65 T-scores or from the 69th to 93rd percentile) and "high" scores (from 65 to 80 T-scores or from the 69th to the 99.9th percentile). These values are cited for one test or in order to assess one capability. As we used two tests in our research, we based it on the total of the T-scores for the two tests.

When talking about the level of intellect, we must bear in mind that the results of ability tests, expressed in T-scores, are not absolute in nature, but are instead relative. This is due to fact that when we transfer the raw data from the scores (number of correctly resolved tasks) to the standard scale, we benchmark the results of specific managers with the indicators of the norm group, in other words with the results of other managers, who completed these tests previously. The group of people defining the test norms (the norm group) is similar to our candidates in terms of key criteria (sex, age, profession, work record, etc.). Consequently, we benchmarked the level of intellectual abilities of our respondents with the level of intellectual abilities of top managers working at other companies in Russia. Intellect is of practical significance and depending on the environment in which the individual lives and works, these or other intellectual abilities will be mission critical for the individual's adaptation and success as a leader. And it is these mission critical abilities that should be assessed when forecasting leadership success. In addition, these results should be benchmarked against analogous results. In other words, it would be wrong to assess the level of intellectual abilities of a college student by performing a comparison with the intellectual abilities of the leader of a large company. This does not mean that a student cannot possess a comparable intellectual level. We are merely citing the illegitimacy of such a comparison. It goes without saying that it would be an oversimplification to assume that intellectual abilities are the root cause of everything. We only cited this example to emphasize the need for a differentiated approach to the assessment of intellect. The level

of intellectual abilities is critical for the effectiveness of leadership behavior and may only be used as an indicator for forecasting the individual's leadership potential in cases where the following terms and conditions have been met:

1. The assessed abilities are relevant for the performance of activities where the individual realizes his/her potential as a leader.
2. Their level is determined by benchmarking them against the level of these abilities held by the people in the individual's entourage or who may be his or her followers.^{28–36}

Conclusion

The advanced hypothesis is only partially confirmed. We found that there is a significant correlation between cognitive abilities test results and competency scores in AC, but we cannot say that the higher the manager's intelligence, the higher rating of competencies he will get. Our research, conducted to identify the correlation of the level of intellectual abilities and a manager's success, enabled us to draw a conclusion of key theoretical and practical importance. It can be summed up as follows: a low level of intellectual abilities may reduce materially the likelihood of a candidate's success in a management position. At the same time, a high level of intelligence is not necessarily a competitive advantage against an individual with an above-average intellectual level, when compiling a forecast of the manager's success. The practical benefit of these results relates to the importance of using ability tests when assessing potential and existing managers. It is highly likely that the results of the cognitive ability tests will facilitate forecasts of a manager's effectiveness not only at the time of employment, but also during the training and promotion of employees to management positions.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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