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How to Measure Technological Capabilities (Case study: Cooperative Investment Guarantee Fund)

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Abstract

"Technology Assessment" is a tool or intellectual framework thought whose aim is to have a better understanding on technology and helps make decisions about it. Today, technology assessment at the macro level as an information source that injects data into the policy making process, is presented. Technology Assessment needs to analyze and evaluate the results intended and unintended, opportunities and risks of technologies, including new technologies or immobilized ones. The study was conducted in investment guarantee fund of cooperation and its statistical sample is fund members and they seek to evaluate technological capabilities of one case study and finally seek to present practical solutions for improving it. In this study using questionnaire data related were collected and analyzed. The results showed that the level of technological capabilities in Guarantee Fund investment cooperation is located in classes of (companies) Group C and close to organizations (companies) in Beginner Group D. Meanwhile the results indicated there is a gap between appropriate level of technological capabilities (score 100%) and level present. Therefore, the fund is required to do the right action for solving this capability gap.

Keywords: technological capabilities, measurement, evaluation, and technology.

Introduction:

Technology is all the knowledge, products, tools, methods, and systems that serve to make the product or service. Technology is the transferring process and converting resources into products through knowledge, experience, information and tools (Tariq Khalil). Assessment needs technology and it is a framework and tool which is designed for detection and identifying required capabilities to perform technological priorities in developing countries (Unido 2002).

Evaluation technology capability is a process in which the current level of competences technological strength and weaknesses of the technology are measured.

Also we can compare technological capabilities of the organization with competitors or ideal level or offset adverse cases. Today, with the progress of the technology at different levels and also the necessity of the use of modern technologies, we need to evaluate technology more and more. Technology assessment of a tool or intellectual framework, helps us to have a better understanding of technology and decision-making. So, to develop and use the new technology, we should first assess the current situation of the existing technology.

Literature review:

Technology assessment is a tool or intellectual framework, which helps to have a better understanding of the technology and making a decision about it. Today, technology assessment at the macro level is introduced as a source of information that injects information to the Policy.

Technology assessment should consider analyses and evaluation of wanted and unwanted results and opportunities and risks of new technologies, including new technologies or stabilized one.

The slogan of technology assessment is that a new technology should be better than the previous one, otherwise there is no need to it, “being the best " should be considered both scientific aspect of technology and also pays attention to the environmental and socio- economic dimensions.

In our country, there is less attention to measurement technology capability and culture and even if organizations are willing to move in this direction, there isn’t enough authorities and resources available.

On the other hand companies and manufacturing firm`s have always been involved in a lot of administrative issues such as buying, selling, raw materials, accounting, insurance and so on and radical changes exist in the computational environment.

So the use of technology assessment methods and models in these firm`s is not accountable for executives management and experts. In other words, technical management and experts are not capable of subjective estimation of companies `s capabilities in different area of the technology.

Today, to remain in the race, organizations must change toward technology and advanced technologies. But one question arises here, in the route to obtain technology, is what is the best way to alleviate the technological gap. (Jafarnejad 2006)

For assessing technological capability of the firm, we should use technological needs assessment model. According to this model we measure firm`s capabilities from 9 dimensions through a questionnaire. Classification of technological capabilities dimensions in the model are as follows: (Innosutra,2007)

Awareness capability: the ability and awareness of the firm and the need to improve the technology.

Search capability: firm`s capability to identify opportunities and technological threats.

Ability to create core competence, firm`s capability to create core competence (the distinction between rivals).

Technology strategy capability: firm`s capability in developing a good strategy to assessing and selecting strategy.

Technology acquisition capability: The company's ability to obtain and employ a technology.

The ability to employ and attract technology: firm`s capability, in the implementation of the effective use of technology.

Learning capability: firm`s capability in learning previous experience in improving technology and new products.

The capability of exploitation of external linkage: firm`s capability in communicating with supply network and the exploitation of external linkage (universities, co - operation with the advisory institutions and evaluation, GABZ government incentives)

After completing the questionnaire by experts , the scores are summed up and are compared with the total values in Table 2, and the results show firm`s capability level . Of course for more accuracy, return of total scores is multiplied by 5 and questionnaire was scored with continuous spectrum. (Khamse 2010)

Table 1: form to determine the results of technological needs assessment

Detailed class		Classification of firms	Level of Capabilities	Total Points	The overall audit results
Beginner	1 -40	Passive (A)	1	1-120	Your firm is poor in all important fields, acquisition, operation, development strategy, and needs technology and major and urgent improvement plan
Middle way	41 - 80				
Leader	81 - 120				
Beginner	121-160	reactive(B)	2	121-240	In most areas of your company, strategy, research, acquisition and capacity building poorly are developed and need high potential for the reconstruction of these areas
Middle way	161 - 200				
Leader	201- 240				
Beginner	241 - 280	strategic(C)	3	241-360	Your company is relatively strong in internal capabilities and has a strategic approach to technology, but is trailing in most areas of national technology.
Middle way	281 - 320				
Leader	321 - 360				
Beginner	361 - 400	creative(D)	4	361-480	Your company has well-developed technological capabilities and can recognize national boundaries of technology. It has a creative and pioneering approach in a number of areas and takes advantage of technology to gain competitive effectiveness
Middle way	401 - 440				
Leader	441 - 480				

According to this model and classifying Table 2, firm`s are divided into four types in term of ability.

Type 1 firm (passive firm). The first kind of firm is not well aware of its needs for technology transferring or environmental improvements. It doesn't know how to improve one side of technology capability and so unlikely can't have fixed and stable policy.

Type 2 firm (reflexive firm): they realize the necessity of improving the technological capabilities to achieve the goals of the development and growth, but because of limitation of inner resources (lack of key skills, and individual experiences) just reacts to the environmental threats and is not capable of exploiting events for its own benefits.

Type 3 firm (strategic firms): they know how to enhance their technological capabilities as well, they have strategic look and high ability to perform projects.

Type 4 firm (creative firm): The firms such as Microsoft and Ford have middle or upper middle income and improve their technological capabilities with great speed.

Research methods:

The goal of this study is determining the level of assessment guarantee fund investment cooperation. Assessment is applied in terms of goal and its survey in terms of method

Research question:

1- What is the level of technological capabilities of guarantee fund company investment cooperation?

2- According to technological capability, in which category does level of guarantee fund company investment cooperation is placed?

3 –In what level each of the 9 dimensions of technological capabilities of guarantee fund company investment cooperation place?

Statistical population:

All employees of guarantee fund investment cooperation degrees – from diploma to MA with each amount of expertise form statistical population: Statistical population has been found with respect to fund at the time of evaluation. Most staff were less than 2 years of work experience and had bachelor's degree.

Analysis and results:

Statistical analysis: In this type of analysis the collected data were classified and summarized using statistical indicators.

Analysis based on the judgment of experts: using the professional judgment of experts to analyze information is one of the most important decision-making methods in assessment which has special importance in its results. The possibility of errors or a high percentage of errors in other methods of analysis may reduce results `s credit. These methods have been used to analyze data questions.

Table 2. Awareness capability: capability and awareness of fund to recognize the needs to improve the technology.

Awareness component	Average Rate Index 1	Average Rate Index 2	average Posts awareness

achieved score	15.93	16.76	16.34

The first index: fund is the most important technology in consciousness. Average gained index is 15.93 points from 20 points, which indicates high awareness of the fund, nearly as technologies that uses in their work.

The second indicator: technology plays a vital role in business strategy. Average gained index is 16.76 points from 20 points which indicates the importance of the role of technology in business of the fund in the minds of experts of the fund.

The gap in this component is 3.66 and it is vital for the technology of the business.

Table 3. Search capabilities: ability to identify opportunities and technologic threats.

Search component	Average Rate Index 3	Average Rate Index 4	average Posts awareness
Score	16.10	15.62	15.86

The third indicator: the fund is ready to evaluate new technological opportunities. Average gained index is 16.10 points from 20 points and it indicates that fund has understood new technological opportunities and is ready to pick up and use the newest update.

Fourth Index: fund can assess weaknesses of the technology. Average gained index is 15.69 points from 20 points. It shows that the fund knew its weakness and has changed it into strengths to achieve superior performance.

Table 4. Capability to create core competency: the ability of the fund in creating core competency (differentiation between competitors or superior performance in government organizations).

Core Competencies Components	Average Rate Index 5	Average Rate Index 6	Average post core competency
score	16.03	14.93	15.48

The fifth index: fund has specific technological capabilities that can benefit from it. Average gained index is 16.03 points from 20 points. Fund has enough preparation to raise productivity and to improve fund performance which should use them.

Sixth Index: fund is aware of external and internal technological resources. Average gained index is 14.93 points from 20 points. Existing technologies know inside and outside of the country to some extent and also have a reliable point of its own.

Fund is aware of precious and non-precious factor which has effect on the core competency. But not to develop or maintain their core competency.

Table 5. The capability of technology strategy: the ability of the fund to develop a good strategy in supporting the business.

technology strategy Component	technology strategy Component	Average Rate Index 8	Average Rate Index 9	Average strategy technology
Score	15.69	16.14	15.90	15.91

Seventh index: fund management team is skilled in technology strategy formulation to achieve business goals. Average gained index is 15.69 points from 20 points respectively, which represents the strategic vision of future fund and the acceptability of the leadership and fund management in the mind of colleagues.

Eighth index: fund recognizes its technological priority with regard to targeted support from corporations. Average gained index is 16.14 points from 20 points respectively. Fund has concerns in connection with the use of technology that can identify and prioritize cooperatives supports.

Ninth index: fund has a good perspective for the development of technology. Average gained index is 15.9 points from 20 points, respectively.

Fund (company) is aware of his core competency and strategies not only work on market demand (customer) but also on how to use the potential of their core and try the leadership in services as well.

Table 6. Assessment Technology and capabilities selection: the ability of the fund for evaluation and selection of a proper technology is a good solution.

evaluation and selection Component	Average Rate Index 10	Average Rate Index 11	Average appraisal and selection
Score	15.24	14.97	15.10

Tenth Index: fund knows how to choose his technology requirements. Average gained index is 15.24 points from 20 points respectively. This index is required in selection of technology. Fund knows what it wants and which technology should be served.

Eleventh index: fund is aware of the best internal and external resources of the technology. Average gained index is 14.97 points from 20 points, respectively.

Fund (the Company) has built a well-developed technology framework to select and has guaranteed their short-term issues such as price and accessible services (goods). In the long-term issues such as services and support can be covered and the ability to attract funds and expand the selected technology is at an acceptable level.

Table 7. Technology acquisition capabilities: the ability to obtain and using technology fund.

technology acquisition Component	Average Rate Index 12	Average Rate Index 13	Average post technology acquisition
score	12.14	10.52	11.33

Twelfth Index: fund has a good performance in serving technology from external sources. Average gained index is 12.14 points from 20 points respectively. This rating indicates the lack of effectiveness of the applying of external technologies.

Thirteenth index: fund has relationship with major external supplier of technology. Average gained index is 10.52 points from 20 points respectively. Lack of communication technologies with distributers shows foreign technologies.

Table 8. Utilization capability and absorption of technology means the ability to participate in the implementation and effective use of technology.

Utilization and absorption	Average Rate Index 14	Average Rate Index 15	Using the mean absorbance and utilization
score	13.76	14.17	13.97

Fourteenth index: technological activity Fund (planning, research and development and information technology) has been effectively organized to serve the superior technologies. Average gained index is 13.76 points from 20 points respectively.

Fifteenth index: fund has a transparent process for technology projects. Average gained index is 14.17 points from 20 points respectively, which shows lack of transparency in technological projects.

Fund (now) has some experience of management, technology implementation, but doesn't have framework or the risk management, nor a continuous assessment of the progress of the project to report.

Table 9. Learning capability means the ability to participate in learning from previous experiences in improving technology and new products.

Learning component	Average Rate Index 16	Average Rate Index 17	Average Rate Index 18	Average post learning
score	14.10	15.59	16.93	15.54

Sixteenth index: fund has a suitable system to evaluate technology projects. Average gained index is 14.10 points from 20 points respectively. Fund is a relatively good indicator to assess their technological projects that must be improved.

Seventeen index: fund pays attention to future projects and reviews them. Average gained index is 15.59 points from 20 points respectively. Fund also looks on future technologies, but still doesn't have good understanding of its future projects.

Eighteen index: the fund has the ability to learn from one technology to another technology. Average gained index is 16.93 points from 20 points respectively and has a relatively good score.

Fund (the company) regularly reviews the progress of their projects and it is concerned how it can do the next project better from the perspective of technology and learning.

Table 10. Utilization capability of external linkage means company's ability to communicate with the network provisioning and utilization of external linkage (academic, cooperation with institutions consultancy and evaluation in, government incentives, etc.).

using external linkage Components	Average Rate Index 19	Average Rate Index 20	Average Rate Index 21	Average Rate Index 22	Average Rate Index 23	Average Rate Index 24	External linkage
Score	15.90	14.38	15.69	15.10	8.86	10.59	13.42

Nineteenth index: our government's policy encourages us to use technology. Average gained index is 15.90 points from 20 points respectively.

Twentieth index: fund benefits from technology assessment for consulting firm`s / consultants. Average gained index is 14.38 points from 20 points respectively.

Twenty-first index: fund uses those outside of the company for its technology development. Average gained index is 15.69 points from 20 points respectively.

Twenty-second index: fund uses other firm`s in the implementation of their technology strategy. Average gained index is 15.10 points from 20 points respectively.

The twenty-third index: funds use other universities on key technology projects. Average gained index is 8.86 points from 20 points respectively.

Twenty-forth index: funds cooperate to public research centers in the implementation of important projects. Average gained index is 10.59 points from 20 points respectively.

With regard to the averages low point which this component has, we conclude there is no technological support from outside of the fund. And there is no help from the centers of the fund, or specific companies and technological research and it doesn't use research in its development.

Conclusion:

The level of technological capability of cooperative investment guarantee fund has been placed in the ranks of the organization (companies) Group C and those close to the organization (companies) novice group D. Organizations C (strategic) have a right insight into how to improve technological capabilities. They are capable of doing their projects, and with a strategic look are capable of making ability. And also due to priority-oriented attitude, the organization will be powered with the formulation of the future strategy and increasing internal capabilities in managerial and technical fields.

Although the C type organizations are capable of reacting quickly and effectively to the rules of the new environmental technology (the ability to change in short-term), the organization need a new policy and new macro policy to increase innovation in parts in which has superior performance.

There may also be a need for further access to new sources of funding. C type organization benefits from strategic awareness concentrated on the latest technologies that is needed for mid-term and long - term courses.

The companies will leave behind in most areas the technology borders with systematic planning and with a view of strategy and gradually will move to become D - type organization, which is the creative and innovative one.

Table 11: The gap in different aspects of the desired level with technological capabilities

Gap	average competencies score	the number of indicators	dimensions
18.3	81.7	2	awareness
20.7	79.3	2	Search
22.6	77.4	2	core competence
20.5	79.5	3	Technology strategy
24.5	75.5	2	assessment and selection
43.4	56.6	2	technology acquisition
30.2	69.8	2	and attraction utilization
22.3	77.7	3	Learning
32.9	67.1	6	**External linkage**
26.1	**73.9**	**24**	average total

Top leaders of investment guarantee fund of cooperation can define the appropriate strategic plan and pays attention to the research and development and improves the processes and seeks to eliminate the existed technological gap.

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