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Full Length Research Paper

The implementation of advanced production and management technologies in Turkey automotive sector

Suleyman Semiz[1]* and Rasih Demirci[2]

[1]Department of Mechanic Education, Technical Education Faculty, Pamukkale University, Kinikli, Denizli 20100, Turkey. [2]Departman of Business Administration, Faculty of Administrative Sciences and Economics, Gazi University, Besevler, Ankara, Turkey.

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In this study, advanced production and management technologies which are implemented in Turkey Automotive Sector have been examined. The factors such as the aims of implementation of ATs, the levels attainable to aims and the factors blocking the usage have been evaluated. In use of advanced technology in sector, the result of that many goals have been targeted to perform has been achieved. In use of APTs, as the factors especially that are "speeding up and shortening the production process", "quality improvement", "reducing costs", "increasing production" are considered the important aims; and, in use of AMTs, the factor that is "ensuring effective and efficient working environment to take advantage of human resources at the highest level" comes to the fore. The leading one of the factors blocking the use of advanced production technology has been seen to be "financial problems. When evaluating that case along with the result of that advanced technologies are the most important factor affecting competitive tools, it can be stated that the companies have an idea that there is a compulsory to overcome this problem. Also, in sector, it has been achieved that the result of the important aims between today and the future in concern with the concentration of different APTs and AMTs implementations were determined.

Key words: Advanced technology, technology management, Turkey automotive sector.

INTRODUCTION

Organizations have needed to apply different production and management styles in different years along with technological developments in 20th century and organizations have tried to provide perfermonce criteria related to their products such as price, quality, variety and being different. Organizations have constantly tried to be "ideal organization" by providing expected performance criteria in manufacturing of products and service. Because, the approaches about being ideal organization has been changed according to years. This change is seen in Table 1 (Maleki, 1991).

When the criter of being ideal organization was price in 1960s, "quality" has been added to this criter in 1970s according Table 1. Also, "variety of products" has been added to these criteria with differentation in customers' requests in 1980s and the organizations which provides all of these criteria have been described as flexible organization. The organizations have the characteristic of being different are placed in markets as innovative organizations in 1990s. By providing these criteria, organizations have implemented different production and management technologies to be ideal organization. And, in a research studied, "difference in the level of technology" has been determined as the most important factor which affected competition (Uygur, 1981). However, the factors that are stated in Table 2 can be changed according to years which have priority and different sectors. But still, difference in the level of technology can be considered as the one of the significant factors. For this reason, renewing of technology is one of the most important

*Corresponding author. E-mail: ssemiz@pau.edu.tr, ssemiz55@yahoo.com. Tel: +90 258 296 30 69. Fax: +90 258 296 32 63.

Table 1. Performance criteria and changes in the type of ideal organization.

Years	Performance criteria	Type of ideal organization
1960	Price	Efficient organization
1970	Price + Quality	Quality organization
1980	Price + Quality + Variety of products	Flexible
1990	Price + Quality + Variety of products + Being different	Innovative organization

Table 2. Factors affecting competition in the world markets.

Factors	Weight
Difference in the level of technology	10.00
Cost of labour	8.40
Investment per capita	4.50
Difference in input price	3.24
Quality	3.07
Energy	1.89
Efficiency	1.75
Manufacturing capacity	1.70
Advantage of raw material	1.63
Marketing an advertising	1.61
Organization's effecting	0.80
Easing of transport	0.80
Easing of export	0.80
Investment cost and its term	0.13

important problems for the organizations.

ADVANCED TECHNOLOGIES

AT is described a new and related technic which makes a change in production methods, management systems, product design and manufacturing in an organization (Tekin et al., 2000). Also, these technologies can also improve the criteria according to traditional systems such as productivity, quality and efficiency.

ATs can be grouped under two headings as production and manangement technologies. While production technologies are mostly related to physical structure and, management technologies are related management activities which are needed to manufacture more efficient and productive. As these technologies include both computer aided design-production technologies and management approach-technics, sum of these technologies are considered under a heading of AT on which makes an investment (Demirci et al., 2008).

ATs are also described as hardware-based and softer forms (Burgess and Gules, 1998). While ATs such as computer aided design (CAD) and computer aided manufacturing (CAM) are described hardware-based tecnologies, and, such as just in time (JIT) and total quality management (TQM) tecnologies are considered as *softer* forms

Advanced production technologies (APTs)

The base of APT is consisted of Numerical and Computer Numerically Control (CNC) machines. First Numerically Control (NC) machines have been formed by adding control systems to traditional machines after 1940s (Browne et al., 1988). Later, computers have been added to these machines and it has been obtained Computer Numerically Control (CNC) Machines. The ease of programmable of CNC Machines provides the organizations with producing a wide range of parts. APT is the sum of the design of products and process, planning production and controlling it and technologies used by the aim of integrating these activities (Gerwin and Cododdny, 1992). The ones which are mostly implemented are explained thus:

- Computer aided design (CAD) is the technology defined as the usage of computers completely to be able to make the design and analysis of the product which will be manufactured (Evans, 1997).
- Computer aided manufacturing (CAM) is described generally as the sum of controlled production techniques transforming a material into a product being ready for sale and their pre-preparation steps (Evans, 1997).
- Computer integrated manufacturing (CIM) systems can be defined as a total system, which provides an automatic link between product design, manufacturing engineering, and the factory floor (Kahraman et al., 2004).
- Group technology (GT) is a highly efficient processing method, which divides different parts of a product into different types according to their shape, size, material, processing pattern and necessary equipment (Gong, 2002).
- Flexible manufacturing systems (FMS) provides productivity to increase in big ratios since it prevents time losses separated the operations like carrying, waiting, loading, unloading (Browne et al., 1984).
- Robots (R) are reprogrammable multifunction manipulator that can perform a variety of tasks, such as material handling, welding, painting drilling, machine loading and unloading, etc (Dorf, 1999a).

It is a fact that there are different APTs apart from the

ones that are described above. However, those which are leadings have been undertaken here. Technologies such as computer aided process planning (CAPP), computer aided quality control (CAQC), and automatic guided vehicles (AGV) can be given as example for them.

Advanced management technologies (AMTs)

AMTs are the technologies which are developed in parallel with production technologies and determined according to needs. The organizations also need to make a change in their management technologies and to apply different management styles in parallel with their developments (Aydogan and Semiz, 2005). Nowadays, many AMTs are implemented with the aim of providing to maximum benefit from organizational sources (Tusiad, 2002).

It's also possible to apply more than one of AMT styles as which they are connected with each other. But, providing the business criteria is significant to get from possitive results in the point of business criteria such as productivity, quality, economically and efficiency by implementing these management styles. AMTs and their brief explanations have been presented below.

- Total quality management (TQM) is a management philosophy that fosters an organizational culture committed to customer satisfaction through continuous improvement (Abrunhosa and Moura, 2002).
- Just in time (JIT) practices is to reduce and ultimately eliminate waste, enhance the quality of the product, and improve delivery efficiency (Ahmad et al., 2003).
- Reengineering (RE) is radically rethinking the business processes and radically redesigning with the aim of making striking improvements on the most important performance measurements of our age like cost, quality, serve and speed (Hammer, 1990).
- Benchmarking (BM) is the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognized as industry leaders (Dorf, 1999b).
- Organizational learning (OL) expresses the process of developing the abilities necessary for providing the people in the organization to understand their deeds better and eventually to make activities effectively and of getting information (Garvin, 1993).
- Human resources management (HRM) is evolving from a primarily industrial relations and personnel function to that of the creation and mounding of strategic and systemic policies and practices aligned with business goals in an environment of intense global competition (Edwina, 2007).

There are different AMTs apart from those that have been previously described. Material requirement planning (MRPI), Manufacturing resource planning (MRP II), Concurrent Engineering (CE) can be given as example for different AMTs.

AUTOMOTIVE SECTOR IN THE WORLD AND TURKEY

Advancement of automotive sector is in propotional to development of production technologies. Since the beginning of 1900s, cost of unit in production which have been realized in a few small workshops using labour-intensive and according to order was high. It was not possible to talk about any standart related to the vehicles produced. In 1908, Henry Ford who was Pioneer of American Otomotive Industry, first, developed serial production method with his T-Model project. He has realized that by getting rid of deficiencies in production. System was the production style that depended on division of labour on assembly line which moves.

World Automotive Sector showed a very fast development in the beginning of the 20th century. The number of automobile brands around the world reached from 8 in 1880 to 50 in 1885 and 500 in 1890 (Blommfield, 1978), Given these vehicles were made in small workshops, with simple operating instruments , as being out of standard and mainly based on manpower, it's understood that they showed a fast development in early years. It's expected that the 57 millions vehicle capacity of vehicle production capacity around the world will reach 76 millions in 2015. The numbers show that automotive sector has a growth tendency of 3% in a year. This situation shows that the value produced in 2015 will catch $1,050 billion. Today this value is $760 billion (Sweden, 2005).

While motor-driven vehicle production was only 9,500 in 1900, it became over one million in 1915. It reached 10 million 500 thousand in 1950, 48 million 500 thousand in 1990 and 57 million 800 thousand in 2000. And total production exceeded 66 millions 2006. Although the majority of production was realized by the countries like the USA, Japan, Germany, France, England, Italy, other countries started to take important shares of production as well after 1970s. These are the countries like South Korea, Spain, China, Mexico, Russia, India and Brazil.

Automotive industry is seen as the locomotive of production sectors in the world since started serial production and especially today. This huge industry has 2 trillion dollars of gyro all around the world. With its main and supply industries, it employs directly 8 million people and indirectly over 40 millions people. In this sector, technologic developments and computer applications are always attracted attention with the contribution on the world trade. In the other side, automotive sector keeps the place of being locomotive of all countries' economies and plays active role in the development of the sectors as iron-steel at first and such as petro-chemistry, tire, glass, electricity, and electronics. Automotive industry products in Turkey have significant share as main and supply

Table 3. Change in automotive sector of Turkey according to years.

Years	2002	2003	2004	2005	2006	2007	2008
Production (unit)	346565	533672	823408	879452	987580	1099413	1147110
Capacity use (%)	36	53	74	77	81	86	77
Export (billion dolar)	2.58	4.34	7.14	8.03	9.92	12.78	14.87

Table 4. Distribution of scale spaces in evaluations.

Value	Comment
1.00-1.80	Never
1.81-2.60	Very few
2.61-3.40	Medium
3.41-4.20	Large scale
4.21-5.00	Full

industry in foreign trade (ICC, 2003). Import and export numbers in this sector attract attention when especially looked at last a few years. The change in Turkey Automotive Sector according to the years in 2002 - 2008 has been showed in Table 3 and investment amounts separated for vehicle production has been shown below (OSD, 2009).

Turkey automotive sector and advanced technologies

Automotive sector is a sector which is open to innovations, follows and uses advanced technology. In Turkey, many foreign organizations are run. These organizations prefer our country because of reasons like its geographical situation and labor cost is relatively low. In automotive sector which is one of the sectors in which new technology production is the most intensive one, it is necessary not only to follow the developments but also to lead the developments. While that is being done, continuing the productivity of managements increasingly is also an important goal. In sector, making necessary changes in some factors like human resources, production techniques, management ways and process in time is important to realize goals. While different production and management technologies are being implemented in the sector, it's necessary to provide harmony between them as well. The research comprises totally 17 institutions running in automotive production sector in Turkey (Semiz, 2004).

In the research, it is aimed to determine "aims of the implementation of AT", "the levels attainable to these aims" and "factors bloking the implementation of AT". Also, it has been tried to determine levels of implementing of AT targeted today and for next five years by obtaining affecting levels of ATs on competitive tools.

In resaearch, total of 17 organizations running in automotive main industry in Turkey have been determined as the research field. However, the answers got from 13 organizations of those have been evaluated. Four organizations have not joined the research due to various causes.

In research, it has been accepted that the automotive main industry which has been selected as the research field implemented ATs. Firstly, pilot study has been held in an organization after being prepared suitable questions to the field. Survey forms have been rearranged according to the pilot study and then it has been provided these forms to be filled via the methods of post or face-to-face interview. The forms have been provided to be filled by senior managers of technology. These senior managers have been accepted to have requisite knowledge. It has been paid attention that the answers must not be privacy for organizations. And, these questions must have a content that does not bloke to be answered. It has been supposed that the answers given were true. The data have been analyzed with the program SPSS (Statistical Package for Social Science) 15.0 for Windows and evaluations have been done according to a point of likert scale. Distrubition of scale spaces in evaluations is shown in Table 4.

Most of manegers (77%) are managers of production department. In the other hand, rest of managers of quality, human resources and research-development (R&D) departments are joined equally. Most of managers joined the survey are graduated with a bachelor's degree. It is seen that the rest of them are graduated with master degree.

THE AIMS OF IMPLEMENTATION OF AMTs AND THE LEVELS ATTAINABLE OF THEM

The aims of implementation of APTs in organization and relationships of levels attainable are seen in Table 5 (Semiz, Okay, and Sekmen, 2004).

According to that, it is seen that all the means of using aims are above 4.00 except the elements of "decreasing the ratio of diminution and loss" (3.85). It is understood that many aims are targeted to be realize at high levels in these organizations while the organizations invests in APT. In the other hand, means of "the levels attainable" shows us that these aims have been realized at high levels. "Increasing quality" (4.23), "savings of workforce" (4.08) providing flexibility in production" (4.08) are aims that have been significantly realized.

Table 5. The aims of implementation of APTs and the levels attainable of them.

Aims	f	Importance degree		The levels attainable	
		Mean	SD	Mean	SD
Speeding and shortening of production process	13	4.62	0.51	3.92	0.49
Increasing quality	13	4.54	0.66	4.23	0.83
Decreasing cost	13	4.46	0.66	3.69	0.75
Increasing manufacturing	13	4.39	0.77	3.62	0.65
Increasing of competitive power	13	4.31	0.75	3.69	0.63
Sawing workforce	13	4.08	0.86	4.08	0.86
Providing flexibility in manufacturing	13	4.08	0.76	4.08	0.76
Decreasing the ratio of diministion and loss	13	3.85	0.99	3.46	0.88

Table 6. The aims of the implementation of amt and the relationship of the level attainable.

Aims	f	Importance degree		The levels attainable	
		Mean	SD	Mean	SD
Increasing efficiency	13	4.46	0.66	3.77	0.60
Providing customer satsfaction	13	4.31	0.95	3.92	0.76
Providing precisely definitions of tasks	13	3.92	0.86	3.54	0.78
Providing peace and work discipline of personnel	13	3.85	0.90	3.54	0.78

Table 7. The factors blocking the implementation of ATs.

Factors blocking	f	Importance degree	
		Mean	SD
Financial problems	13	4.23	1.17
Technical assistance and service problems	13	3.23	1.01
Insufficient for R&D activities	13	3.23	1.09
Indefinitenes of technology strategies	13	3.08	1.12
Careless technology selection	13	3.08	1.32
Rapid change in the technology	13	2.69	1.03
Insufficient in personnel's training	13	2.69	0.86
Lack of sufficient engineers and technic service	13	2.31	1.03
Lack of connection with sub-industry organizations	13	2.31	0.95

The aims of use of AMTs and relaitonships of the level attainable are shown in Table 6 (Aydogan and Semiz, 2005).

According Table 6, the aims of "increasing efficiency" (4.46) and "providing customer satisfaction" (4.31) are the aims that are important at "large scale" level in respect of importance degree in using of AMT. In the other hand, "providing peace and work discipline of personnel" (3.85) and "providing precisely definitions of tasks" (3.92) are the aims that are important at "large scale"level. While evaluated according to "level attainable" it has been concluded from that four the aims have been realized at "large scale" level.

Factors blocking the implementation of ATs

The means and standart deviations of importance degree of the factors blocking the implementation of AT are seen in Table 7 (Demirci et al., 2008).

"Financial problems" are the most significant one of the factors bloking the implementation of AMTs according to Table 7. This factor which has a high mean can be considered as an important problem in implementing of technology. "Insufficient in R&D activities" is seen that sources have been significantly used for AT transfer. "Indefinitesses of strategy" about how much will be invested in which technology and "technic assistance and

Table 8. Effecting levels of APTs and AMTs on competitive tools.

Competitive tools	F	APTs		AMTs	
		Mean	SD	Mean	SD
Reducing errors in manufacturing	13	4.15	0.69	4.23	0.83
Using minimum source in manufacturing	13	4.08	0.64	4.15	0.90
Presenting a wide range of products	13	4.00	0.58	3.85	0.90
Ability to make a rapid change in product quantities	13	4.00	0.78	3.77	0.93
Ability to make a change quickly the product according to general customer needs	13	4.00	0.71	3.77	0.83
Ability to make a change quickly the product according to special customer needs	13	3.92	0.64	3.77	0.93
High-reliabilty production	13	3.92	0.76	4.00	0.58
Rapid a new product development	13	3.69	0.95	3.69	0.95
Fast delivery	13	3.62	0.87	3.69	1.11

service problems" of the technology transferred are the factors that are attracted attention. The means of the factors such as "lack of sufficient engineers and technic personnel" and "lack of connection with sub-industry" are seen to be low. It is understood from that, the problems about workers and organization can be overcomed.

Effecting levels of implementing AT on competitive tools

It is shown that the effecting levels of APMTs on competitive tools in Table 8 (Demirci et al., 2008).

It is seen that the means of effecting levels of all factors are high according Table 8. From this, it can be stated that all of competitive tools have been affected by using of APTs. Especially, it is seen that the criteria such as "decreasing using of sources in production", "producing according to customer needs", "presenting a wide range of products" and "ability to make a rapid change in product quantities" have been affected with important means.

When evaluated the effecting levels of AMTs on competitive tools, it is seen that the factors of "reducing errors in manufacturing" and "using minimum source in manufacturing" have been affected with the highest mean. It can be stated that using of AMT affects forming organizations more healty and realizing organizational culture efficiently. Providing fast delivery with decreasing time losses in production process, and realizing high realibility production are the possitive results of using of AMTs.

Implementation level forecasts on APTs and AMTs today and within a 5-year process

For getting the difference of approximate points of implementation level of production and management technology in automotive sector today and after five years, t-test was used. The results were shown in Table 9 (Semiz et al., 2008).

It has been determined that there was an increase in CAD implementation levels in organizations according to forecasts of today (4.38) and five years later (4.77) [$t_{(12)}$ = -2.132; $p < 0.05$]. The CAD implementation means realized in at "full" level in both categories.

It's seen that there is an increase in CAM implementation levels of managements according forecasts of today (3.38) and five years later (4.00) [$t_{(12)}$ = -2.551; $p < 0.05$]. This numerical increase in CAM implementation points of organizations has been found out meaningful statistically. The advance became from "middle level" towards "large scale."

It's seen that the mean of CIM implementation points of organizations today and after 5 years reaches from 2.69 - 3.15. [$t_{(12)}$ = -2.521; $p < 0.05$]. CIM implementation points of organizations realized at "medium" level.

It has been determined that there was a meaningful increase in GT implementation levels of organizations according to forecasts of today (3.23) and five years later (3.77) [$t_{(12)}$ = -2.941; $p < 0.05$]. This numerical increase in GT implementation points of organizations has been found out meaningful statistically and its level increased from "middle" to "large scale." level.

It has not found out a meaningful difference in FMS implementation levels of organizations between today (3.62) and five years later (3.54) forecast [$t_{(12)}$ = 0.249; $p > 0.05$]. This numerical decrease in FMS implementation points of organizations is not meaningful statistically and both two values realized at "large scale" level.

It has been determined that there was a meaningful increase in R implementation levels of organizations between forecasts of today (1.92) and after five years (2.85) [$t_{(12)}$ = -4.382; $p < 0.05$]. This numerical increase in robot usage points of organizations has been found out meaningful statistically and its level reached from "very less" towards "medium."

When paid attention to the values between implementation levels of APTs in the sector before five years and approximate implementation levels of five years later, it can be stated that organizations follow

Table 9. T-test for the difference of implementation points of APTs belonging today and the period after five years results.

AMT		Mean	N	SD	t	p
CAD	Nowadays	4.38	13	0.77	-2.132	0.054
	Five years later	4.77	13	0.44		
CAM	Nowadays	3.38	13	1.39	-2.551	0.025
	Five years later	4.00	13	0.82		
CIM	Nowadays	2.69	13	1.32	-2.521	0.027
	Five years later	3.15	13	1.28		
GT	Nowadays	3.23	13	1.17	-2.941	0.012
	Five years later	3.77	13	0.83		
FMS	Nowadays	3.62	13	1.04	0.249	0.808
	Five years later	3.54	13	0.97		
R	Nowadays	1.92	13	0.86	-4.382	0.001
	Five years later	2.85	13	0.99		

Table 10. T-test results for the difference of approximate implementation points of AMTs today and after five years.

AMT		Mean	N	SD	t	P
JIT	Nowadays	3.46	13	1.56	-2.920	0.013
	Five years later	4.15	13	1.28		
TQM	Nowadays	4.08	13	0.76	-3.207	0.008
	Five years later	4.54	13	0.66		
RE	Nowadays	3.54	13	1.20	-2.144	0.053
	Five years later	4.00	13	1.08		
BM	Nowadays	3.85	13	0.90	-2.521	0.027
	Five years later	4.31	13	0.75		
HRM	Nowadays	3.62	13	1.33	-3.323	0.006
	Five years later	4.31	13	1.03		
OL	Nowadays	3.46	13	1.27	-4.382	0.001
	Five years later	4.08	13	1.12		

these technologies at close range and are willing for the use in the future. It's seen that higher level implementation of APTs is a goal.

For getting the difference of approximate implementation points of AMTs between today and five years later, t-test has been used. The results have been shown in Table 10 (Semiz et al., 2008).

It has been determined that there was increase in JIT implementation levels of organizations between today (3.46) and five years later (4.15) forecasts [$t_{(12)} = -2.920$; $p < 0.05$]. This increase in implementation forecasts shows that both two levels are at "large scale" level.

It has been determined that there was a meaningful increase in TQM implementation levels of managements between today (4.08) and five years later (4.54) forecasts [$t_{(12)} = -3.207$; $p < 0.05$]. This numerical increase in TQM

implementation points of managements shows the rise from large scale towards “full” level.

It has been determined that there was an increase in RE implementation levels of organizations between today (3.54) and five years later (4.00) forecasts [$t_{(12)} = -2.144$; $p < 0.05$]. This numerical increase in RE implementation points of managements shows that the implementation at “large scale” level is aimed in both two terms.

It has been determined that there was a meaningful increase in BM implementation levels of organizations between today (3.85) and five years later (4.31) forecasts [$t_{(12)} = -2.521$; $p < 0.05$]. This numerical increase in BM implementation points of managements shows statistically the rise from “large scale” towards “full” level.

It has been determined that there was a meaningful increase in HRM implementation levels of organizations between today (3.62) and five years later (4.31) forecasts [$t_{(12)} = -3.323$; $p < 0.05$]. This numerical increase shows statistically the rise from “large scale” level to “full” level.

It has been determined that there was an increase in OL method implementation levels of organizations between today (3.46) and five years later (4.08) forecasts [$t_{(12)} = -4.382$; $p < 0.05$]. Although there is a numerical increase in organizational learning method implementation points of managements, it’s seen “large scale” level implementation in both two categories.

It is seen that there is an increase in the implementation level of AMTs and the organizations aim to apply a higher level implementation of these technologies for the future. This situation is provided that forming organizational culture, establishing more productive working environment and increasing the pleasure of works.

RESULTS AND EVALUATIONS

It is seen that the goals of the implementation of APTs and AMTs in automotive sector in Turkey have been realized. The organizations in this sector aim to implement technologies developed and innovated five years later as well as now. The results of the effects of ATs on business criteria are:

- It is seen that the aims which are the most important in implementing of APTs for the organizations are “speeding up the production process”, “increase in quality”, “decreasing cost”, “increasing production” and “increasing competitive power”. “Increasing quality”, “savings of workforce”, “providing flexibility in production” and “speeding up production process” are paid attention which are the aims that have the highest mean in respect of attainable. When examined the aims and the levels attainable to these aims in implementing of APTs, it can be stated that the aims have been significantly realized.
- By implementing of AMTs, organizations aim at benefiting at top level from human resources. In this way, it is tried to provide an efficient business environment through hormony between human and technology. Also, “working of personnel in peaceful” is the one of important elements of “customer satisfaction” in implementing of AMTs. It has been seen that the levels attainable in implementing of AMTs have been mostly realized at “large scale”. It can be concluded from this, if it is paid attention to implementing of AMTs, it can be possible to obtain possitive results.

- It is seen that the element of “financial problems” is leading one of the factors blocking the implementation of AT in organizations. After being solved of “financial problems”, organizations can easily overcome negative effects of other factors. Especially, with being overcomed of some technological problems through R and D, the implementation cost of ATs will significantly decrease.
- The implementation of APTs and AMTs affects the competitive tools at important ratios. This situation is an important reason to implementation ATs. If organizations overcome their financial problems, they will have taken an important step for competiton.
- According to difference between forecasts belonging today and the period 5 years later in implementation of APTs, it is predicted that all technologies will increasingly be implemented. There is only a decrease in the mean implemantation level of FMS. But this is not significant. It can be stated that the organizations are open to development and innovation due to the goals of APTs implementation.
- When paid attention to predicted levels in implementation of AMTs, it is under-stood there will be an increase in implemenatation of all technologies. As a result of positive contributions of management technologies they implemented, they aim to implement them more efficient.

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