COMPANY EMPLOYEES' PERCEPTION OF R&D AND PERCEPTION'S EFFECT ON DEPARTMENTS

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Abstract

In today's business world, research and development activities become important in each passing day by technological development and accelerated innovation. Harmonization of research and development activities (R&D) what have a place in companies and other departments is so important for organizational productivity. Accordingly, in this research, determination of company employees' R&D perception and its influence on other departments can strengthen the relation between departments. Research conducted is carried out with 211 private sector employee who labors in Yıldız Technical University's Techno Park in Davutpaşa and Istanbul Technical University. In Scope of research, descriptive statistics are examined related with R&D attitudes. Also difference of R&D attitudes' level related with employees' department type and reliability analysis are materialized. The results obtained indicated that the relation between departments, information Exchange of departments and department employee's sense of proximity are high correlated. Finally, in scope of research, each of departments' employee sense of R&D department are detected as different from each other.

Keywords: *R&D, Performance, R&D Management, Coordination*

ŞİRKET ÇALIŞANLARININ AR-GE ALGISI VE DEPARTMANLAR ÜZERİNDEKİ ETKİSİ (TEKNOPARK UYGULAMASI)

Özet

Bugünün iş dünyasında, AR-GE faaliyetleri teknolojik gelişmeler ve hızlanan inovasyonlar ile birlikte daha da önemli hale gelmektedir. Şirketlerdeki AR-GE faaliyetlerinin diğer departmanlarla uyum içerisinde olması, organizasyonun üretkenlik / verimlilik için oldukça önemlidir. Buna göre, bu çalışmada, AR-GE çalışmaları ile ilgili kararlılığın şirket çalışanlarınca benimsenmesi ve diğer bölümler üzerindeki etkileri departmanlar arasındaki ilişkiyi güçlendirebilir. Bu çalışma, Davutpaşa'daki Yıldız Teknik Üniversitesi Techno Park'ında ve İstanbul Teknik Üniversitesi'nde çalışan 211 özel sektör çalışanı ile yürütülmüştür. Araştırma kapsamında, AR-GE bakış açısı/ davranışıyla ilgili konular tanımlayıcı istatistik çalışmaları ile incelenmiştir. Ayrıca, çalışanların çalıştıkları departman türüne göre AR-GE bakış açısındaki farklılık seviyesi ve AR-GE çalışmalarına olan güvenilirlik analizi somutlaştırılmıştır. Departmanlar arası ilişkiyle ilgili elde edilen sonuçlar, bölüm çalışanlarının yakınlık hissi ve departmanlar arası bilgi değişimi arasındaki korelasyonun yüksek seviyede olduğu görülmektedir. Sonuç olarak, araştırma kapsamında departmanın her bir çalışan için Ar-Ge departmanına olan duyarlılığının birbirinden farklı olduğu tespit edilmiştir.

Anahtar Kelimeler: *AR-GE, Performans, AR-GE Yönetimi, Koordinasyon*

1. INTRODUCTION

Nowadays companies are in fierce competition environment. To provide a competitive advantage requires producing original product and developing them. At this point, R&D activities what takes an important place in technological management studies come into prominence. According to Bölükbaş (2013: 6), R&D is a creative work what increases the repertory of culture, people and society and uses it to design a new process, system and applications. R&D activities include product design and software activities and experimental, scientific and technique content. This process goes on till idea to product, product to continuous improvement, improvement to annihilation of product (Öner, 2006: 6). In case mentioned R&D activities are so costly and comprehensive. These activities include risks in point of companies because of its long term yield. To minimize risks and take advantage of R&D are based on systematic R&D activities and performance measurement. Following the searches indicates that invention, patent, technology management; novelty, product development, know-how and industrial design are concepts which support R&D activities. Besides R&D management is guidance and control of R&D activities and its stages. These activities have importance for companies (Palamutçuoğlu, 2015: 72). So as to meet an expectation of customers by one product of brand, R&D activities assume following the latest developments and its implementation. Companies' technological information what shape with R&D activities, provide community development and economic progress (Ekren, 2000: 1-2). When R&D activities in company are increased, It is possible to enhance of scientific progression. So reformed R&D activities play a significant role to determine the development level of country (Kavak, 2009: 620). As noted above, the aims of R&D management are producing a qualified product and achieving the improvement activities. Also a set of corrective actions is done for increasing of productivity and regulating the workflow planning correlated with company policies (Tuominen vd., 1999: 138). According to Knowledge-Based Approach, information and qualifications of companies are sum of company employees' information and qualifications (Demirkaya vd., 2011: 447). Therefore, the most important factor while managing of R&D process is company employees. Human factor has a directly effect on communication between departments. Additionally, it is seen obviously that developing product and idea is correlate with learning activities of employees. The two general results of R&D activities are learning and innovation. Also, information transfer and shared vision are two factor what have an impact on organizational learning. According to Çemberci (2013:116-117), there is a relation between dependence of learning, shared vision, information transfer and organizational project and departmental project learning. Namely, as information sharing inter department in organization is increase, so organizational and departmental project learning becomes easy. Thus, success of project and success of organization increase. Therefore, information transfers inter departments and so important. Besides that the R&D related to relational operations was also important to a good connection between the many actors involved in the conception of services. At the same time research results determine that the possibility of considering projects and researchers widens the scope and allows the inclusion of a net of actors who might interact and contribute to R&D especially in services. So interdepartmental information sharing seems to contribute to the improvement of statistics related to R&D in services (Bohrer & Raupp de Vargas, 2014: 803). In this context, organization's R&D culture – the values and behaviors that contribute to the unique social and psychological environment of an organization improves with collaboration of interdepartmental (Tagged, 2014: 5) So carrying out the

relationship between departments and process of collaboration is required for completing R&D activities and job process productively. This survey purposes to create awareness by displaying the sense of R&D activities of company employees and alteration about their sense.

2. AIM OF THE STUDY

The purpose of this study was to examine the company employees' perception of R&D and this perception's effect on departments. So answers of the research will be searched these questions:

1)   What is the perception level related proximity of departments about R&D?

2)   What is the eliciting level of department to R&D department?

3)   What is the level of relation between other departments and R&D department?

4)   Is there any connection between department's relation with R&D and proximity to R&D and eliciting to R&D?

5) Do the levels of attitude become different from department to other departments?

3. METHOD

3.1 Universe and Sampling

Target population of this study composes of private sector employees of Yıldız Technical University's Techno Park in Davutpaşa and Istanbul Technical University. In this research, convenience-sampling method used because of the difficulty related with reaching all the employees. Population of is formed with 500 private sector employees working in techno park. Research sample consists of 211 private sector employee who labors in Yıldız Technical University's Techno Park in Davutpaşa and Istanbul Technical University. To reckoning of sample, method of calculation, which numbers the known population, is used. After calculation, results 217 persons are suitable for analyzing. In scope of research, 230 questionnaires were distributed. Nine questionnaires are regarded as invalid because of their empty answers. Finally, 211-sample sizes are reached.

3.2 Data Collection and Devices

Data collection tool of this research is a survey form what has a two section. Chapter one includes demographic features (gender, age,, educational background, marital status, term of employment in company, term of employment in sector and department). In second section, private sector employees' attitude scale about R&D what has 26 items was used. In this research Likert-type scale what has a 5-point from 1 'strongly disagree' to 5 'strongly agree' was implemented to measure the participation level of private company employees. Survey questions about R&D attitude are classified in 3 section. Chapter A queries proximity of other departments to R&D department, Chapter B examine providing information from other departments to R&D department. In addition, chapter C queries the relationship between R&D department and other departments. This scale's validity and reliability study is carried out in similar way with Murat (2010).

3.3 Analysis of Data

Data of this survey were analyzed with Statistical Package for Social Sciences (SPSS) 21. In this research, private sector employees who are in the group of sample were analyzed. In addition, their demographic characteristics were analyzed with Frequency and Percentage analyzes. For descriptive statistics belong to R&D scale were calculated arithmetic mean and standard deviation. Because data distribution is parametric (normal distribution), analysis of variance is used to compare 3 and more group key to scale of R&D's demographic characteristic. As a result of variance analyze, Scheffe Test was used to find a variation between groups. For specifying the relation between R&D and other departments, proximity to R&D and providing information to R&D department, Pearson correlation analyze was done. Finally to examine the reliability test belong to scale, Cronbach's Alpha reliability analysis was done.

4. RESULTS

Table 1 shows preliminary results of the study.

According to study, 75,8 % of survey participants were male. 68,5 % of survey participants were single, 42,7 % of survey participants were between 26-30 ages. Besides that Participant of this survey has a age average as 29. Most of the participants were graduated from bachelor's degree with the 62,2 %. Also 32,7 % of survey participants are working in this company about one year.

Table 1. Survey Participants' Demographic Information

Gender	Number	Percent (%)
Male	160	75,8
Female	51	24,2
Total	211	100,0
Marital Status	**Number**	**Percent (%)**
Single	144	68,2
Married	67	31,8
Total	211	100,0
Age	**Number**	**Percent (%)**
20-25	51	24,2
26-30	90	42,7
31-35	46	21,8
36 +	24	11,4
Total	211	100,0
Age Average = 29		
Educational Status	**Number**	**Percent (%)**
Associate Degree	51	24,2
Bachelor's Degree	132	62,6
Postgraduate	28	13,3
Total	211	100,0

Operation Time in Company	Number	Percent (%)
1 year	69	32,7
2 year	51	24,2
3 year	35	16,6
4 year +	56	26,5
Total	211	100,0

Operation Time Average in Company = 2,74

Operation Time in Sector	Number	Percent (%)
1-3 year	66	31,3
4-6 year	72	34,1
7-9 year	39	18,5
10 year +	34	16,1
Total	211	100,0

Operation Time Average in Sector = 5,5

Department	Number	Percent (%)
HR	36	17,1
Software	71	33,6
Reporting	17	8,1
Finance	39	18,5
It	37	17,5
Other	11	5,2
Total	211	100,0

The average of term of employment was determined as some 2,74 years. Furthermore, 34,7 % of participants have a 4-6 years of sector experience. Otherwise professional time average in sector is 5,5 years. In scope of research, 17,1 % of participants are working in HR department and 33,6% of participants are working in Software department. Also, 8,1 % of participants are working in Reporting department. Finally, 18,5 % of participants are working in Finance department and 5,2 % of participants are working in Other departments.

Table 2. Descriptive Statistics Related R&D Attitude

R&D Attitude	$\overline{X}$	sd
Proximity of Worked Department to R&D	3,87	1,24
Providing Information by Worked Department to R&D	3,67	1,08
The Relation of Worked Department with R&D	3,76	1,19

When employees' attitude analyzed from different department, the level of "Proximity of Worked Department to R&D" ($\bar{X}$ = 3,87), "Providing Information by Worked Department to R&D" ($\bar{X}$ = 3,67) and "The Relation of Worked Department with R&D" ($\bar{X}$ = 3,76) was determined as a high level, (Table 2).

Table 3. The Results of Pearson Correlation Coefficient

		Proximity of Worked Department to R&D	Providing Information by Worked Department to R&D	The Relation of Worked Department with R&D
Proximity of Worked Department to R&D	r	1	0,730	0,895
	p	-	0,000**	0,000**
Providing İnformation by Worked Department to R&D	r	0,730	1	0,756
	p	0,000**	-	0,000**
The Relation of Worked Department with R&D	r	0,895	0,756	1
	p	0,000**	0,000**	-

** p<0,01

In this survey "The Relation of Worked Department with R&D", "Proximity of Worked Department to R&D" and "Providing Information by Worked Department to R&D" are determined as correlated sub-dimensions (p<0,01). When factors of relation are examined, the highest relation can be seen between "Proximity of Worked Department to R&D" and "The Relation of Worked Department with R&D". This correlation is determined very strong and positively (p<0,01) (0,80<r<1,0) (r=0,895), (Table 3).

In this study one way ANOVA analyze is done to determine significant difference of participant's R&D sub-dimension attitude by worked department. Also, there is a statistically significant difference of R&D attitudes according to worked department. To determine the variance of employees' R&D attitudes, homogeneity test is done. Results of this test show that variances are homogen (p>0,05 p=0,076). Because of these results to get to the bottom of this differences, Scheffe Test is used as a type of Post Hoc Test, (Table 4)..

Table 4. One Way ANOVA Test Results Belong to Differentiation of Participant's R&D Attitude Level According to Worked Department Type

R&D Attitudes	Worked Department	n	$\overline{\text{X}}$	sd	F	p	Scheffe
Proximity of Worked Department to R&D	HR	36	3,47	1,24	4,678	0,008*	2-4 2-5
	SOFTWARE	71	3,90	1,18			
	REPORTING	17	4,11	0,77			
	FINANCE	39	3,94	0,69			
	IT	37	4,05	1,01			
	OTHER	11	3,83	1,12			
Providing İnformation by Worked Department to R&D	HR	36	3,60	0,90	3,379	0,016	2-3 4-5
	SOFTWARE	71	3,75	0,63			
	REPORTING	17	3,79	0,91			
	FINANCE	39	3,64	0,60			
	IT	37	3,53	0,90			
	OTHER	11	3,75	0,66			
The Relation of Worked Department with R&D	HR	36	3,53	1,18	6,757	0,002*	2-4 2-5
	SOFTWARE	71	3,81	1,01			
	REPORTING	17	4,05	0,93			
	FINANCE	39	3,75	0,72			
	IT	37	3,79	0,88			
	OTHER	11	3,75	1,12			

*P<0,05 1. group HR, 2. group SOFTWARE, 3. group REPORTING 4. group FINANCE, 5.grup IT, 6. group OTHER

As a result of Scheffe Test, there is a difference about the perceived relation of worked department with R&D department (F=6,757, p<0,05). In consequence of Scheffe Test, employees of software department have a statistically significant difference from finance department and IT department. Otherwise the sense of relation between Software department ($\overline{X} = 3,81$) and R&D is higher than finance department ($\overline{X} = 3,74$) and IT department ($\overline{X} = 3,79$)'s sense of R&D.

As a result of Scheffe Test there are some differences about providing information by worked department to R&D department (F= 3,379, p<0,05). Software department employees has a statistically significant difference from employees of Reporting department and IT department. Sense of providing information by Reporting Department ($\overline{X} = 3,79$) to R&D is higher then Software department's sense of employees ($\overline{X} = 3,75$). Besides this Sense of providing information by Finance department ($\overline{X} = 3,64$) to R&D is higher than IT department's sense of employees ($\overline{X} = 3,53$).

As a result of Scheffe Test, there is some differences about proximity of worked department to R&D department (F= 4,678, p<0,05). As a result of Scheffe Test, software department employees are different from IT department and Finance department employees. Finance department employees' proximity of R&D is higher ($\overline{X}$ = 3,94) than software department employees and ($\overline{X}$ = 3,90) HR department employees ($\overline{X}$ = 3,47). Also, IT department employees' proximity of R&D is higher than ($\overline{X}$ = 4,05) software department ($\overline{X}$ = 3,90) too.

Table 5. Results of Reliability Analysis Belong to R&D Attitudes

R&D Attitudes	Cronbach's Alpha	N of Items
Proximity of Worked Department to R&D	0,945	8
Providing İnformation by Worked Department to R&D	0,844	8
The Relation of Worked Department with R&D	0,942	10

It is seen in Table 5, "Providing Information by Worked Department to R&D" sub-dimensions' reliability coefficient is calculated as 0,945. "Providing Information by Worked Department to R&D" sub-dimension's reliability coefficient is calculated as 0,844. "Also, The Relation of Worked Department with R&D" sub-dimension's reliability coefficient is calculated as 0,942. These values indicate that dimensions have high reliability (0,80< Cronbach's Alpha<1,0).

5. CONCLUSION

Most effective way to proceed in the end is produced of technology. At this point, R&D activities come into prominence what have an important position in technological management. R&D activities include risks for companies because of its costly and wide ranged structure. Also, long term gaining pose some risks to companies too. In an attempt to minimize these risks, R&D activities must be conducted systematically and assays must be done correctly. Besides, for getting better results about R&D activities require to work with other departments correspondingly. Therefore, to determine how department's employees perceive R&D activities gives tips to company managers about making real of strategic targets by all the departments.

In the direction of this survey, which is realized to determine company employees' sense of R&D activities and their effect on departments, indicated that the relation between departments, information Exchange between departments and department employee's sense of proximity are statistically high correlated. In addition, according to study, proximity of other departments to R&D department and relation between other departments and R&D department have a positive relationship. In this study, there is a significant difference between employees of finance department, IT department and software department. At finance departments employees' proximity of R&D department is higher than software department's

employees. Besides that, IT department employees' proximity of R&D department is higher than employees at software departments too.

The study results show that when information Exchange is increased, relation between departments will improves and proximity level will rise. Then powered communication network and interaction yields what increases the productivity of company. Besides depending on interdepartmental sharing, sense of R&D indicates variability. Also department employees who work for common targets get high level R&D perception. High level perception of R&D belong to financial department shows that effective financial polity and financial strategies determines R&D activities. So, this situation creates a sharing environment of interdepartmental. Similarly, IT department what determines the problems about informatics and technology and finds a solution about them requires being active with close contact.

In today's working conditions with high-level competition, being positioned of R&D department in another department's mind is so important for sustainability of company. If sense of R&D department rises, employees adopt the innovations in company quickly. Also in this way, adaptation of employees to technological progress must be taken into consideration. Admittedly, importance of informing to employees about innovation process and provide them to work for common targets bring to company success and outstanding performance in the long term. It should not be forgotten that when company motivates employees, they would work for company objectives.

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