TIME DRIVEN ACTIVITY BASED COSTING SYSTEM IMPLEMENTATION IN THE INTERNAL AUDIT DEPARTMENT OF A BANK[*]

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ABSTRACT

Organizations using traditional cost systems are having difficulties in fulfilling today's business requirements in competitive markets. An efficient and effective cost system should be in place for the satisfaction of needs of competitive environment in which technology, digitalization and efficiency are the key drivers. In the literature, allocation of indirect costs and also calculation of unused capacity of the resources are the hot topics of the cost and performance evaluation research. An effective costing system known as Time-Driven Activity Based Costing system (TDABC) can be used for the measurement of product or service costs with accurate and reliable data considering unit costs of resources allocated to activities and the time length required for execution of these activities and the determination of unused capacity. This system properly elaborates the cause and effect relations between resources and their costs identifying the activities/ sub-activities.

This article presents a case study which shows all the stages of TDABC in the internal audit department of a bank by analyzing the operations of the department and defining all the activities that consume the resources. The goal of this paper is to design a cost accumulation system to calculate the cost of audits of the internal audit department of a bank by implementing TDABC system.

Keywords: TDABC, Cost Systems, Case Study in a Bank, Management Accounting

JEL Classification: M41, M10

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BİR BANKANIN İÇ DENETİM BİRİMİNDE ZAMAN ETKENLİ FAALİYET TABANLI MALİYETLEME SİSTEMİ UYGULAMASI

ÖZ

Geleneksel maliyetleme sistemlerini kullanan kurumlar günümüz rekabetçi piyasa koşullarında ihtiyaçlarını karşılarken zorluklar yaşamaktadır. Teknoloji, dijitalleşme ve verimliliğin anahtar faktörler olduğu bu rekabetçi ortamda, ihtiyaçların karşılanması için verimli ve etkin bir maliyetleme sisteminin kullanılıyor olması gerekmektedir. Literatürde, dolaylı giderlerin paylaştırımı ve kaynakların kullanılmayan kapasitesinin hesaplanması, maliyet ve performans değerlendirme araştırmalarının sıcak gündem maddeleri arasında yer almaktadır. Zaman Etkenli Faaliyet Tabanlı Maliyetleme Sistemi, faaliyetlere paylaştırılan kaynakların birim maliyetlerinin ve bu faaliyetlerin gerçekleşmesi için gerekli olan sürenin dikkate alınması suretiyle, ürün ve hizmet giderlerinin doğru ve güvenilir verilerle hesaplanması ve kullanılmayan kapasitenin belirlenmesi için kullanılabilmektedir. Söz konusu sistem, faaliyetler ve alt faaliyetlerin belirlenmesi durumunda, bu faaliyetler için gerekli olan kaynaklar ve maliyetleri arasındaki sebep sonuç ilişkilerini doğru bir şekilde ortaya koymaktadır.

Bu makale, bir bankanın İç Denetim birimine uyarlanan Zaman Etkenli Faaliyet Tabanlı Maliyetleme Sisteminin tüm aşamalarını kapsayan bir vaka çalışmasından oluşmaktadır. Makalenin amacı, söz konusu sistemin uygulanması sayesinde ve İç Denetim maliyetlerinin hesaplanması amacıyla, bir gider sisteminin tasarlanmasıdır.

Anahtar Kelimeler: TDABC, Maliyet Sistemleri, Banka Vaka Çalışması, Yönetim Muhasebesi

JEL Sınıflandırması: M41, M10

GENİLETİLMİŞ ÖZET

AMAÇ ve MOTİVASYON

Finansal hizmetler sektörünün lider alanı olan bankacılığın maliyet sistemlerinin etkinliği, teknolojik gelişmeler, yeni mevzuatlar ve sektörel gelişmeler de dahil olmak üzere sektördeki önemli yapısal değişikliklerin yanı sıra büyük ölçekli finansal krizler nedeniyle dijital yüzyılda kritik bir kavram haline gelmiştir. Bankaların verimliliği, maliyetlerinin yönetimine ve maliyetler karşılığında müşterilerine ürün/hizmetlerin fiyatlandırılmasına bağlıdır.

Bankacılık sektöründe çok fazla uygulama örneği olmayan Zamana Dayalı Faaliyete Dayalı Maliyetleme sistemi (TDABC), maliyetlendirme sistemlerini iyileştirmek ve Faaliyete Dayalı Maliyetleme sisteminde karşılaşılan zorlukları çözmek için Kaplan ve Anderson (2004) tarafından geliştirilmiştir.

ARAŞTIRMA STRATEJİSİ ve YÖNTEMİ

Literatürde farklı sektörlerdeki birçok TDABC uygulaması yer almaktadır. TDABC hakkında yayınlanmış araştırmaların büyük bir kısmı Sağlık sektöründedir (Demeere ve diğerleri, 2009; Campanale ve diğerleri, 2014; Kaplan ve diğerleri, 2014, 2015; McLaughlin ve diğerleri, 2014; Donovan ve diğerleri, 2014; Akhavan ve diğerleri, 2016; Laviana ve diğerleri, 2016; Öker ve diğerleri, 2013). Lojistik alanında da önemli sayıda vaka çalışması yapılmıştır (Bruggeman ve diğerleri 2005; Everaert ve diğerleri 2007; Varila ve diğerleri 2007; Gervais ve diğerleri 2010; Somapa ve diğerleri 2011; Ratnatunga ve diğerleri 2012) . Ağırlıklı olarak incelenen diğer sektörler ise konaklama ve yeme-içme sektörleri (Dalci ve diğerleri, 2010; Hajiha ve diğerleri. 2011; Everaert ve diğerleri, 2012; Riediansyaf, 2014), kütüphaneler (Pernot ve diğerleri, 2007; Kont & Jantson, 2011); Siguenza-Guzman vd., 2014) ve imalatçı firmalardır (Adıgüzel ve Floros, 2019; Öker ve Adıgüzel, 2010). Bildiğimiz kadarıyla TDABC'nin bankacılık sektörü için uygulanmasına ilişkin literatürde herhangi bir çalışma bulunmamaktadır.

Bu çalışmada, Türkiye'de özel bir bankanın iç denetim biriminde TDABC uygulaması gerçekleştirilmiştir. Bankanın birimleri arasında, iç denetim birimi harcama bütçesinde öne çıkan birimlerden biridir. Bu nedenle bu yazıda iç denetim biriminin maliyetleri mercek altına alınacaktır.

Banka bünyesinde iç denetim, risk yönetimi ve iç kontrol birimlerinin faaliyetleri, ilgili mevzuata uygun ve icrai fonksiyonlardan bağımsız olarak doğrudan yönetim kuruluna bağlı bir organizasyon aracılığıyla yürütülmektedir. Buna göre, iç denetim birimi yönetim kuruluna raporlamaktadır. Bankanın genel müdürlük lokasyonunda 10.000 m2 alanda 60 birimi faaliyet göstermektedir. İç denetim birimi, bankanın genel müdürlüğünde 800 m2'lik bir alanda bulunmaktadır. İç denetim birimi 128 personeli ile BDDK'nın (Bankacılık Düzenleme ve Denetleme) ilgili mevzuatına uygun olarak tüm Genel Müdürlük birimlerine, yurt içi ve yurt dışı iştiraklere ve tüm yurt içi ve yurt dışı şubelere geniş bir yelpazede yerinde ve uzaktan denetim hizmetleri sunmaktadır.

BULGULAR ve TARTIŞMA

TDABC uygulanırken öncelikle alt ve ana faaliyetleri yürüten kaynaklar belirlenmiştir. Vaka çalışmasında kaynaklar, Baş Denetçiler, Denetçiler, Denetçi Yardımcıları ve Operasyonel Personel gibi farklı rollerdeki çeşitli çalışanlardır. Baş Denetçiler, yönetim rolüyle aynı anda birkaç denetim ekibine liderlik etmekten sorumlu kıdemli denetçilerdir. Denetçiler ise her bir denetim ekibinin üyesi ve lideridir. Denetim ekipleri, denetçi yardımcılarının yanı sıra bir denetçiden oluşur. Bu denetçi yardımcıları, esas olarak denetim görevleri kapsamındaki günlük görevlerden sorumludur. Son olarak, operasyonel personel, rutin görevler için diğer departmanlarla iletişim de dahil olmak üzere operasyonel ofis faaliyetlerinden sorumludur.

Vaka çalışmasında uygulanan geleneksel maliyetleme yöntemi ile önerilen TDABC sisteminin sonuçları karşılaştırılmıştır. Sonuçları karşılaştırdığımızda tüm denetim kategorilerine ayrılan TDABC maliyetlerinin geleneksel yaklaşımla hesaplanan maliyetlerden daha az olduğu görülmektedir. Geleneksel maliyet sistemi, maliyetlerin denetim kategorilerine tahsisinde yalnızca denetimlerin süresini ve yıllık denetim sayısını kullanır. Oysa farklı denetim kategorileri kaynakları farklı oranlarda tüketir. Geleneksel maliyet sistemi, her bir faaliyet ve alt faaliyette kaynakların atıl kapasitesini dikkate almaz. TDABC sistemi ile, kullanılan pratik kapasiteyi hesaplayarak ve bütçelenen pratik kapasite ile karşılaştırarak kaynakların kullanılmayan kapasitesini tespit etmek mümkündür.

SONUÇ ve ÖNERİLER

İç denetim birimi için kullanılan TDABC yaklaşımı çok dinamik ve güncellenmesi kolay olduğundan, maliyetleri daha doğru bir şekilde ölçmekte ve bankanın farklı iş kollarına, departmanlarına ve faaliyetlerine uygulanabilmektedir. Bu çalışmanın Türkiye'deki tek bir Banka ile sınırlı olması nedeniyle, çalışmanın farklı coğrafyalardaki farklı Bankaları kapsayacak şekilde genişletilmesinin faydalı olacağını da belirtmekte fayda vardır.

1. INTRODUCTION

Cost efficiency of banking which is globally the leading area of financial services industry has been a critical concept in the digital century, due to the large-scaled financial crises as well as material structural changes in the sector, including technological advances, new legislations, and changes in market dynamics. The efficiency of banks relies on the management of their costs and the pricing of products/services to their clients, in return for the costs.

To improve the costing systems and solve the difficulties faced in Activity-Based Costing system, Time Driven Activity Based Costing system (TDABC) developed by Kaplan and Anderson (2004).

The literature includes reports of many TDABC applications in different sectors. The great part of published research on TDABC are in Healthcare industry (Demeere et al., 2009; Campanale et al., 2014; Kaplan et al., 2014, 2015; McLaughlin et al., 2014; Donovan et al., 2014; Akhavan et al., 2016; Laviana et al., 2016; Öker et al., 2013). A significant number of case studies have been carried out also in logistics (Bruggeman et al. 2005; Everaert at al. 2007; Varila et al. 2007; Gervais et al. 2010; Somapa et al. 2011; Ratnatunga et al. 2012). Other sectors which are mainly investigated are hotels and restaurants (Dalci et al., 2010; Hajiha et al. 2011; Everaert et al., 2012; Riediansyaf, 2014), libraries (Pernot et al., 2007; Kont & Jantson, 2011; Siguenza-Guzman et al., 2014) and manufacturing companies (Adıgüzel & Floros, 2019; Öker & Adıgüzel, 2010). As far as we know there is not any study in literature on the implementation of TDABC for the banking sector.

A TDABC implementation has been carried out in the internal audit department of a private bank in Turkey which is in the center of a process in which cost efficiency has become one of the major strategic aims. Among the departments of bank, internal audit department is one of the biggest in expenditure budget. Thus, costs of internal audit department will be under the spotlights, within this article. It may be an opportunity for the other departments to discover the results of this implementation.

Within the context of following sections, the background information of the company and the related department, TDABC implementation on this company, utilization of capacity and the findings will be given.

2. BACKGROUND OF THE COMPANY & INTERNAL AUDIT DEPARTMENT

The bank is one of Turkey's private banks with consolidated assets at an amount of greater than TL 350 billion as of June 30, 2018. Its shares publicly traded in Turkey, and its depositary receipts in the UK and USA.

The bank is an integrated financial services group operating in every segment of the banking sector covering corporate, commercial, SME, payment systems, retail, private, digital banking together with its subsidiaries in pension and life insurance, leasing, factoring, securities and asset management, and also overseas subsidiaries in Europe.

As of June 30, 2018, the bank offers a large scale of financial services to its clients with more than 18,000 personnel through an extensive distribution network of domestic branches, overseas branches in Europe, departments in the headquarter and several international representative offices in different countries. The bank provides an Omni-channel convenience with seamless experience across all channels with ATMs, an award winning Call Center, internet, mobile and social banking applications, all built on the modern technological infrastructure.

Bank' s continuously improving business model is driven by its strategic priorities focusing on responsible and sustainable development, customer experience, employee happiness, digitalization, optimal capital utilization and efficiency.

Within the bank, the internal audit, risk management and internal control activities are performed in compliance with the applicable regulation and independent of executive functions via an organization that reports directly to the board of directors. Accordingly, the internal audit department reports to the board of directors. The bank has 60 departments in the headquarter and 10.000 m^2 area. The internal audit department was located in the headquarter of the bank in a 800 m^2 area.

The internal audit department provides a wide range of onsite and remote audit services to all Head Quarter (HQ) departments, local and overseas subsidiaries and all domestic and foreign branches with

its 128 personnel, in line with applicable legislation of BRSA (Banking Regulation and Supervision Agency) and CMB (Capital Markets Board). The organization chart of the department is given in Figure 1.

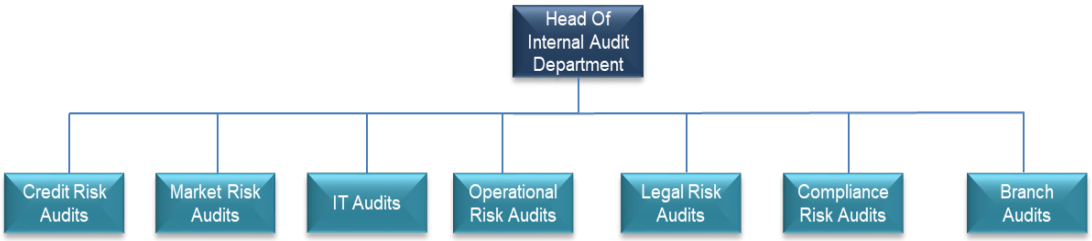

Figure 1. Organization Chart of Internal Audit Department

90 process audits for the HQ departments and 121 audits for the branches have been performed in 2018. Those figures are also the average number of audits per year that have been carried out for the last 3 years. The internal audit department is composed of 4 main blocks (ERM1, ERM2, ERM3, ERM4), first 3 of which are focusing on specific process audit areas, mainly on Credit & Market Risk, IT & Operational Risk and Legal & Compliance risk audits, respectively. On the other hand, ERM 4 is coordinating the onsite branch audits.

25 credit risk audits and 11 market risk audits of 90 process audits are managed annually under ERM1, 13 IT and 20 operational risk audits are being handled by ERM 2 and the remaining 21 are coordinated by ERM3, 12 of which are compliance and 9 are legal risk audits. Their average time duration for each audit category are as follows, in the Table 1. All of these data have been obtained from the formal records of internal audit department, and then verified via interviews with the management of the department.

Table 1. Average Time Duration & no of Audits per year in Each Audit Category

Subunit		Audit Category	# of Audits per year	Average Time Duration (Man-day per audit)	Total Man day used
Process Audits	ERM 1	**Credit risk audits**	25	260	6500
		Market risk audits	11	230	2530
	ERM 2	**Operational risk audits**	20	240	4800
		IT audits	13	260	3380
	ERM 3	**Compliance risk audits**	12	230	2760
		Legal risk audits	9	220	1980
Branch Audits	ERM 4	**Branch audits**	121	20	2420
Total					**24370**

Branch audits have been performed onsite in the branches of the bank, which are located in the widespread area of the country, while process audits are almost being carried out in the headquarter.

3. CURRENT COSTING STRUCTURE

The department determines the costs of its audit activities via the traditional cost system. Direct and indirect year end costs of the department and it's all audit activities are summarized, below (Table 2).

Table 2. Direct & Indirect Costs of Internal Audit Department

Direct Costs	**Total (TL/year)**
Salary	9.101.000
Daily Fees	5.113.000
Premium	2.691.000
Social Security Payroll Tax/Contribution	2.459.000
Compensation Allowance	1.326.000
Traveling Expenses	1.112.000
Social Welfare	501.000
Health Expenses	9.000
Training	88.000
Overtime	25.000
Total Direct Costs	**22.425.000**
Indirect Costs	**Total (TL/year)**
Entertainment Expenses	79.500
Fuel Oil Costs	46.500
Communication Expenses	55.000
Leasing Expenses	612.000
Heating, Lightening & Water Consumption	145.000
Cleaning	92.000
Advisory & Translation Expenses	101.000
Personnel Motivation Expenses	22.000
Maintenance & Repairing Costs	65.000
Information Systems Costs	56.000
Office & Paper expenses	27.000
Total Indirect Costs	**1.301.000**

Within the context of this analysis, the cost objects are credit, market, it, operational, compliance, legal and branch audits. Traditionally, above mentioned direct costs including auditor costs, operational staff costs, health/welfare, training expenses are directly allocated to each audit category, as per the number of auditors working for each audit category, given below (Table 3).

Although overall employee number of the department is 128, 8 of them are operational staff, and 5 of them are the department heads. Average direct cost of each audit category is being calculated based on the number of auditors used by each and by distributing the direct costs of 13 remaining employees to those each audit categories.

Table 3. Current Direct Costs of Each Type of Audit Activity

Audit Category/ Direct Cost	**# of Auditor**	**Add. Staff**	**# of Audits per year**	**Total Direct Cost**	**Direct Cost per Audit**
Credit risk audits	30	3	25	(22.425.000 x 33/128) / 25	231.257 TL
Market risk audits	13	2	11	(22.425.000 x 15/128) / 11	238.902 TL
Operational risk audits	25	3	20	(22.425.000 x 28/128) / 20	245.273 TL
IT audits	16	2	13	(22.425.000 x 18/128) / 13	242.578 TL
Compliance risk audits	12	1	12	(22.425.000 x 13/128) / 12	189.794 TL
Legal risk audits	9	1	9	(22.425.000 x 10/128) / 9	194.661 TL
Branch audits	10	1	121	(22.425.000 x 11/128) / 121	15.926 TL
Total	**115**	**13**	**211**	**22.425.000 TL**	

On the other hand, indirect costs including rental costs, communication, heating, lightening, water consumption, cleaning costs are assigned to cost objects as per man-day spent for audits. With this approach, total indirect cost per man-day used for all audits is calculated as (Total indirect cost/ man-day used in all audits for the whole year), given below:

1.301.000 TL/ 24370 man-day = 53,3 TL/ man-day

Thus, traditional indirect cost of each audit category is calculated, as follows in Table 4.

Table 4. Current Indirect Costs of Each Audit Category

Audit Category	Total Man day used	Unit Cost	Indirect cost of Each Audit Category
Credit risk audits	260	x 53,3 TL	13.880 TL
Market risk audits	230	x 53,3 TL	12.278 TL
Operational risk audits	240	x 53,3 TL	12.812 TL
IT audits	260	x 53,3 TL	13.880 TL
Compliance risk audits	230	x 53,3 TL	12.278 TL
Legal risk audits	220	x 53,3 TL	11.744 TL
Branch audits	20	x 53,3 TL	1.067 TL

The current costing model uses overhead costs and (volume) cost-drivers in calculating the cost of products (audits in this case). Considering the man-day spent for actual number of audits, it does not provide any information about capacity utilization. In this case study, resources are mainly consumed by audit personnel, who are grouped under four categories, considering their functions and wage rates, as well.

Current costing system does not take into consideration the wage rates that affect the cost of audit categories. This is another shortage of the current cost system. The idle resources are ignored in cost calculations. That's why, the traditional approach does not fit current requirements, as the costs currently assigned to each audit category are not totally reliable and correct.

4. IMPLEMENTATION OF TDABC TO THE INTERNAL AUDIT DEPARTMENT

While applying the TDABC, initially the resources who carry out the sub and main activities should be determined. In our case, the resources are various employees in different roles which are the Lead Auditors, Auditors, Assistant Auditors and Operational Staff. Lead Auditors are the senior auditors in charge of leading several audit teams at the same time with a managerial role, while the Auditors are members and the leaders of each single audit team. The Audit teams are composed of assistant auditors, as well as an auditor. Those assistant auditors are responsible for mainly the daily tasks within the scope of audit engagements. Finally, the operational staff is in charge of operational office activities, including communication with the other departments for routine tasks.

The main audit activities performed by the above mentioned roles are the planning, fieldwork, reporting and follow-up stages. The aim of planning phase which is carried out by the lead auditors and

auditors is to perform a brainstorming, research, determine and document all the areas to be audited before the fieldwork is initiated. That's why, the planning activity includes the sub-activities of brainstorming, research and documentation. The cost of this activity is composed of the services given by the lead auditors and the auditors. Lead auditors and auditors have Brainstorming sessions in order to find new areas to be audited. They are searching the audit literature to determine the risks in the auditable area, as well as documenting all the plans prepared. Those employees use resources including the fuel oil and entertainment expenses, within the planning stage.

Following the planning phase, the core of the audit task 'fieldwork' starts, in which the auditors and assistant auditors execute the audits within the auditee's premises, by performing the information gathering, evaluation and verification sub-activities. The detailed information including the systems, procedures, workflows are gathered, before the expected controls on those systems are evaluated. The results of the evaluations are double checked through the verification process. The auditors and the assistant auditors who are performing those tasks, use many resources including the heating, lightening, water consumption, leasing etc.

After the fieldwork stage, the conclusions, findings and executive summary are being documented and agreed with the auditees in the reporting phase by the lead auditors, auditors and assistant auditors as a whole, while the status of those findings are monitored periodically, within the follow-up phase. The conclusions and findings of the fieldwork activities are being documented in an audit report and this audit report is discussed and agreed with the auditees, within the context of reporting stage. The resources including the Advisory & Translation, Information Systems, Maintenance & Reporting costs are used within the reporting stage.

The final stage after reporting is the Follow-up phase. The aim of the follow-up activity for the internal audit department is to monitor periodically the status of recommendations reported in the audit reports. Its carried out by the operations staff, by asking the auditees current status of recommendations, via e-mail.

Within the context of the Time Driven Activity Based Costing implementation, cost of resources is assigned to the above-mentioned main activities which have been determined via several interviews and deep analysis; and then indirect costs are allocated to those activities, as follows, in Table 5.

Table 5. Indirect Costs of Internal Audit Department & Related Activities and Roles

Indirect Costs	**Total (TL/year)**	**Related Activities**	**Roles in those Activities**
Entertainment Expenses	79.500	Planning	Lead Auditor
Gas Costs	46.500	Planning	Lead Auditor
Communication Expenses	55.000	Planning	Auditor
Leasing Expenses	612.000	Fieldwork	Auditor & Assistant Auditor
Heating, Lightening & Water Consumption	145.000	Fieldwork	Auditor & Assistant Auditor
Cleaning	92.000	Fieldwork	Auditor & Assistant Auditor
Advisory & Translation Expenses	101.000	Reporting	Lead Auditor
Personnel Motivation Expenses	22.000	Reporting	Auditor
Maintenance & Repairing Costs	65.000	Reporting	Assistant Auditor
Information Systems Costs	56.000	Reporting	Assistant Auditor
Office & Paper expenses	27.000	Follow-up	Operations Staff
Total Indirect Costs	**1.301.000**		

The audit department was located in the Head Quarter of the bank in a 800 m^2 area. As the auditors uses %60, assistant auditors uses %37 of the mentioned area, leasing, heating, lightening, water consumption and cleaning expenses are associated to the auditors and assistant auditors correspondingly. For auditors 378.200 TL, assistant auditors 233.800 TL in Leasing Expenses; for auditors 89.600 TL, assistant auditors 55.400 TL in Heating, Lightening & Water Con. expenses; for auditors 56.850 TL, assistant auditors 35.150 in Cleaning expenses have been allocated. The remaining %3 of the practical location is distributed proportionally to the area used by auditors and assistant auditors.

By considering the above mentioned information, the total cost of the main activities, contribution of the roles on those costs and their cost capacity rates (CCR) in the internal audit department are given, below. The CCR is calculated by dividing total cost of each role by its practical capacity. Finally, cost of those activities are linked to the products or services, by using "time" as a cost driver, in the following parts of this article.

Table 6. Capacity Cost Rates

Activities in the Audit Process	**Lead Auditor**	**Auditor**	**Assistant Auditor**	**Operations Staff**	**Total Costs (TL)**
Planning	126.000 TL	55.000 TL	-	-	181.000 TL
Fieldwork	-	524.650 TL	324.350 TL	-	849.000 TL
Reporting	101.000 TL	22.000 TL	121.000 TL	-	244.000 TL
Follow-up	-	-	-	27.000 TL	27.000 TL
Total	**227.000 TL**	**601.650 TL**	**445.350 TL**	**27.000 TL**	**1.301.000 TL**
Prac. Capacity	1.645 man day	12.934 man day	11.000 man day	1.864 man day	-
CCR	**138 TL**	**46,5 TL**	**40,5 TL**	**14,5 TL**	-

There are 7 lead auditors in total working for each audit category. Each of them has 252 available working days per year (National holidays are excluded). A lead auditor spends 14 days for vocation, 3 days for health problems, in average. Thus net available capacity per lead auditor is 235 days and for 7 of them the total amount of annual capacity is 1645 man-days. Among this total capacity, 555 man-day practical capacity has been allocated for the planning phase and 1090 man-day has been allocated for the reporting stage of the audits, per year.

An auditor working for the internal audit department has 252 available working days per year. The auditor spends 14 days for vocation, 5 days for health problems and 10 for training in average. As there are 58 auditors and net available capacity per auditor is 223 days, total amount of capacity is 12.934 man-days. Among this total capacity, 1720 man-day practical capacity has been allocated for the planning phase, 8.330 man-day practical capacity has been allocated for the fieldwork phase and 2884 man-day practical capacity has been reserved for the reporting stage of the audits.

On the other hand, an assistant auditor working for the internal audit department has 252 available working days per year and spends 12 days for vocation, 5 days for health problems and 15 for training in average. As there are 50 assistant auditors and net available capacity per auditor is 220 days, total amount of capacity is 11.000 man-days. Among this total capacity, 7.250 man-day practical capacity has been allocated for the fieldwork stage and 3750 man-day practical capacity has been allocated for the reporting stage of the audits.

There are 8 operations staff working for the internal audit department. Each has 252 available working days per year and spends 14 days for vocation and 5 days for health problems. Net available capacity per operations staff is 233 days and total annual amount of capacity is 1864 man-days. All the capacity of operations staff has been allocated for the follow-up works.

According to a set of interviews and evaluations made, an extensive data table including the duration of each activity, sub-activity per each audit category and above-mentioned each employee role has been formed for the implementation of Time Driven Activity Based Cost structure and in order to make further calculations on the next sections of the article. The mentioned data table is given, as follows, in Table 7.

As the time durations, CCRs have already been calculated for each audit category, activities including the planning, fieldwork, reporting and follow-up, their sub activities and employee roles (lead auditor, auditor, assistant auditor and operations staff), the overall time equation for all activities can be formed, in order to simplify the complex cost calculations. The overall time equation regarding those costs is detailed, below, in Table 8.

Cost of audit categories per unit and overall, based on roles and activities, are summarized as follows, in Table 9:

Table 7. Data Table on Time Consumption in each audit category, as per activities and employee roles.

Activity\Audit	**Sub activity\ Audit**	**Roles\Audit**	Credit risk audits	Market risk audits	Op. risk audits	IT audits	Compliance audits	Legal risk audits	Branch audits
Planning	Brainstorming	Lead Auditor	1	1	1	1	1	1	0,5
		Auditor	5	5	6	6	5	4	1
	Research	Lead Auditor	1	2	2	3	2	3	-
		Auditor	8	7	7	6	7	7	0,5
	Documentation	Lead Auditor	1	1	1	1	1	1	0,5
		Auditor	2	2	2	2	2	2	0,5
Fieldwork	Info Gathering	Auditor	10	8	10	9	8	9	3
		Ass. Auditor	10	8	10	9	8	8	3
	Evaluation	Auditor	15	15	15	16	15	14	1
		Ass. Auditor	15	14	15	15	15	14	1
	Verification	Auditor	15	15	15	14	15	14	1
		Ass. Auditor	15	15	15	14	14	14	1
Reporting	Documentation	Lead Auditor	1	1	1	1	1	1	-
		Auditor	20	19	20	18	19	16	2
		Ass. Auditor	60	50	60	55	50	48	2
	Agreement	Lead Auditor	9	7	9	7	7	6	1
		Auditor	50	40	50	45	40	40	1
		Ass. Auditor	10	8	10	7	8	7	-
Follow-up	Follow-up	Op. Staff	10	8	9	7	7	6	1

* All the time consumptions are given in terms of “days”.

Table 8. Overall Time Equation for the Costs of each Audit category

Audit Category	*Activity*	*Sub-activity*	*Activity Cost Equation*	*Time Equation*
Credit risk audits	*Planning*	Brainstorming, Research, Documentation	$3X_1+ 15X_2$	$13X_1+ 125X_2+ 110X_3+ 10X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$40X_2+ 40X_3$	
	Reporting		$10X_1+ 70X_2 + 70X_3$	
	Follow-up	Documentation, Agreement Follow-up	$10X_4$	
Market risk audits	*Planning*	Brainstorming, Research, Documentation	$4X_1+ 14X_2$	$12X_1+ 111X_2+ 95X_3+ 8X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$38X_2+ 37X_3$	
	Reporting		$8X_1+ 59X_2 + 58X_3$	
	Follow-up	Documentation, Agreement Follow-up	$8X_4$	
Operational risk audits	*Planning*	Brainstorming, Research, Documentation	$4X_1+ 15X_2$	$14X_1+ 125X_2+ 110X_3+ 9X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$40X_2+ 40X_3$	
	Reporting		$10X_1+ 70X_2 + 70X_3$	
	Follow-up	Documentation, Agreement Follow-up	$9X_4$	
IT audits	*Planning*	Brainstorming, Research, Documentation	$5X_1+ 14X_2$	$13X_1+ 116X_2+ 100X_3+ 7X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$39X_2+ 38X_3$	
	Reporting		$8X_1+ 63X_2 + 62X_3$	
	Follow-up	Documentation, Agreement Follow-up	$7X_4$	
Compliance risk audits	*Planning*	Brainstorming, Research, Documentation	$4X_1+ 14X_2$	$11X_1+ 111X_2+ 95X_3+ 7X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$38X_2+ 37X_3$	
	Reporting		$8X_1+ 59X_2 + 58X_3$	
	Follow-up	Documentation, Agreement Follow-up	$7X_4$	

Legal risk audits	*Planning*	Brainstorming, Research, Documentation	$5X_1+ 13X_2$	$12X_1+ 106X_2+ 91X_3+ 6X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$37X_2+ 36X_3$	
	Reporting		$7X_1+ 56X_2 + 55X_3$	
	Follow-up	Documentation, Agreement Follow-up	$6X_4$	
Branch audits	*Planning*	Brainstorming, Research, Documentation	$X_1+ 2X_2$	$2X_1+ 10X_2+ 7X_3+ X_4$
	Fieldwork	Info Gathering, Evaluation, Verification	$5X_2+ 5X_3$	
	Reporting		$X_1+ 3X_2 + 2X_3$	
	Follow-up	Documentation, Agreement Follow-up	X_4	

* where x_1, x_2, x_3 and x_4 represents capacity cost rates of lead auditors, auditors, assistant auditors and operations staff, respectively.

Table 9. Overall Costs of each Audit category

Audit Category	*Activity*	*Activity Cost Equation*	*Activity Cost*	*No of Audits*	*Cost/audit (TL)*	*Total Cost (TL)*
Credit risk audits	*Planning*	$3X_1+ 15X_2$	1.112	**25**	**12.207**	**305.175**
	Fieldwork	$40X_2+ 40X_3$	3.480			
	Reporting	$10X_1+ 70X_2 + 70X_3$	7.470			
	Follow-up	$10X_4$	145			
Market risk audits	*Planning*	$4X_1+ 14X_2$	1.203	**11**	**10.782**	**118.602**
	Fieldwork	$38X_2+ 37X_3$	3.266			
	Reporting	$8X_1+ 59X_2 + 58X_3$	6.197			
	Follow-up	$8X_4$	116			
Operational risk audits	*Planning*	$4X_1+ 15X_2$	1.260	**20**	**12.341**	**246.820**
	Fieldwork	$40X_2+ 40X_3$	3.480			
	Reporting	$10X_1+ 70X_2 + 70X_3$	7.470			
	Follow-up	$9X_4$	131			
IT audits	*Planning*	$5X_1+ 14X_2$	1.341	**13**	**11.341**	**147.433**
	Fieldwork	$39X_2+ 38X_3$	3.353			
	Reporting	$8X_1+ 63X_2 + 62X_3$	6.545			
	Follow-up	$7X_4$	102			
Compliance risk audits	*Planning*	$4X_1+ 14X_2$	1.203	**12**	**10.768**	**129.216**
	Fieldwork	$38X_2+ 37X_3$	3.266			
	Reporting	$8X_1+ 59X_2 + 58X_3$	6.197			
	Follow-up	$7X_4$	102			
Legal risk audits	*Planning*	$5X_1+ 13X_2$	1.295	**9**	**10.359**	**93.231**
	Fieldwork	$37X_2+ 36X_3$	3.179			
	Reporting	$7X_1+ 56X_2 + 55X_3$	5.798			
	Follow-up	$6X_4$	87			
Branch audits	*Planning*	$X_1+ 2X_2$	231	**121**	**832**	**100.672**
	Fieldwork	$5X_2+ 5X_3$	435			
	Reporting	$X_1+ 3X_2 + 2X_3$	359			
	Follow-up	X_4	15			

* capacity cost rates (man-day) is as follows: x_1 = 138 TL/day, x_2 = 46,5 TL/day, x_3 = 40,5 TL/day and x_4 = 14,5 TL/day.

5. CAPACITY UTILIZATION ANALYSIS

The traditional cost system does not consider idle capacity of resources in each activity and sub activity. With the TDABC system, it's possible to detect the unused capacity of resources by calculating the used practical capacity and comparing it with budgeted practical capacity, as given in the Table 10, and Table 11, below. Thus, more accurate and reliable results are produced with this methodology.

Table 10. Budgeted Practical Capacity of Audit Personnel (man-day/ year)

Role	No of personnel	Practical capacity/person for a year	Total practical capacity for a year				
			Planning	Fieldwork	Reporting	Follow-up	Total
Lead Auditors	7	235	555	-	1.090	-	**1.645**
Auditors	58	223	1720	8.330	2.884	-	**12.934**
Assistant Auditors	50	220	-	7.250	3.750	-	**11.000**
Operational Staff	8	233	-	-	-	1.864	**1.864**

Table 11. Capacity Usage of Audit Personnel

Roles\ Audit		Credit Risk Audits	Market Risk Audits	Operational Risk Audits	IT Audits	Compliance Risk Audits	Legal Risk Audits	Branch Audits	Total
No of Audits/year		25	11	20	13	12	9	121	211
Lead Auditors	Planning	3x25= 75	4x11= 44	4x20= 80	5x13= 65	4x12= 48	5x9= 45	1x121= 121	478
	Reporting	10x25= 250	8x11= 88	10x20= 200	8x13= 104	8x12= 96	7x9= 63	1x121= 121	922
	Total	325	132	280	169	144	108	242	**1400**
Auditors	Planning	15x25= 375	14x11= 154	15x20= 300	14x13= 182	14x12= 168	13x9= 117	2x121= 242	1538
	Fieldwork	40x25= 1000	38x11= 418	40x20= 800	39x13= 507	38x12= 456	37x9= 333	5x121= 605	4119
	Reporting	70x25= 1750	59x11= 649	70x20= 1400	63x13= 897	59x12= 708	56x9= 504	3x121= 363	6271
	Total	3125	1221	2500	1586	1332	954	1210	**11928**
Assistant Auditors	Fieldwork	40x25= 1000	37x11= 407	40x20= 800	38x13= 494	37x12= 444	36x9= 324	5x121= 605	4074
	Reporting	70x25= 1750	58x11= 638	70x20= 1400	62x13= 806	58x12= 696	55x9= 495	2x121= 363	6148
	Total	2750	1045	2200	1300	1140	819	968	**10222**
Operational Staff	Follow-up	10x25= 250	8x11= 88	9x20= 180	7x13= 91	7x12= 84	6x9= 54	1x121= 121	868
	Total	250	88	180	91	84	54	121	**868**
Total		**6450**	**2486**	**5160**	**3146**	**2700**	**1935**	**2541**	

Starting from the lead auditor role, it is revealed from the TDABC analysis that 478 out of 555 day budgeted amount has been used by the Lead Auditors for the planning activity. The difference between practical capacity and used capacity (555days – 478 days = 77days) is the idle/ unused capacity for the lead auditors. %86 of the practical capacity was used by them. But, it should be noted that, the lead auditors have to be available to be able to perform the planning activity, as they might be dealing with the other phases of audit jobs (eg. reporting). On the other hand, as the Cost Capacity Rate is 138 TL/ day, the cost of unused capacity turns out to be (77 day x 138 TL/ day) 10.626 TL.

Similarly, according to the interviews and calculations made, 1538 out of 1720 man-day was used by the auditors within the planning activity of audits, which results in an idle capacity rate of %11 and 182 man day cost of unused capacity. 4119 out 8330 man-day was spend by the auditors within the fieldwork activity of audits, which results in an unused capacity of 4.231 man-day, cost of unused capacity. Besides, 6.148 man-day among 7.250 day was used per year by the assistant auditors within the fieldwork activity of audits, which results in an idle capacity rate of %15 and 1102 cost of unused capacity.

Within the context of this analysis, by the doing the same evaluations for reporting and follow-up activities, an overall amount of 126.945 TL Idle Cost has been determined, which is very valuable considering the unrivalled efficiency strategy of the bank. They are mostly focused on the auditor and assistant auditor costs in the audit fieldwork activities, as detailed below, in Table 12.

Table 12. Idle Capacity of Audit Personnel

Role	Budgeted	Actual	Idle Capacity	CCR (TL)	Idle Capacity Cost (TL)
Lead Auditors	1.645	1.400	245	138	33.810
Auditors	12.934	11.928	1.006	46,5	46.779
Assistant Auditors	11.000	10.222	788	40,5	31.914
Operational Staff	1.864	868	996	14,5	14.442

6. COMPARISON OF THE COSTS RESULTED FROM TRADITIONAL COST SYSTEM AND TDABC & CONCLUSION

The summary of overall costs of each audit type, based on each audit activity are as follows, in Table 13:

Table 13. Overall Indirect Costs (TL)

Audit Category	Cost of Planning	Cost of Fieldwork	Cost of Reporting	Cost of Follow-up	Overall Cost
Credit risk audits	1.112	3.480	7.470	145	12.207
Market risk audits	1.203	3.266	6.197	116	10.782
Operational risk audits	1.260	3.480	7.470	131	12.341
IT audits	1.341	3.353	6.545	102	11.341
Compliance risk audits	1.203	3.266	6.197	102	10.768
Legal risk audits	1.295	3.179	5.798	87	10.359
Branch audits	231	435	359	15	832

Considering both the overall indirect costs, the Table 14 below describes the differences in the total costs of each audit category among the traditional costs system and TDABC approach.

Table 14. Traditional vs TDABC Overall Cost Analysis

Audit Category	**Traditional Approach Cost per audit (TL)**	**TDABC Cost per audit (TL)**	**Difference (TL)**	**% Change**
Credit risk audits	13.880	12.207	1.673	12%
Market risk audits	12.278	10.782	1.496	12%
Operational risk audits	12.812	12.341	471	3%
IT audits	13.880	11.341	2.539	18%
Compliance risk audits	12.278	10.768	1.510	12%
Legal risk audits	11.744	10.359	1.385	11%
Branch audits	1.067	832	235	22%

When we compare the results, it’s obvious that TDABC costs allocated to all audit categories are less than the costs calculated through traditional approach.

The traditional cost system uses only the duration of audits and number of audits per year in the allocation of costs to the audit categories. Whereas, different audit categories consume resources at different rates.

On the other hand, as TDABC approach used for internal audit department is so dynamic and easy to update, it can be applied for the different business lines, departments, and activities of the bank, in order to measure the costs in a more accurate way and elaborate the idle capacity throughout the bank, which is in line with the strategy of the company. It is also worth to mention that, as this study is limited to a single Bank in Turkey, it will be valuable to extend the study to different Banks in different geographies.

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AUTHORS' DECLARATION

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