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The importance and role of accounting and financing in the application of the circular economy in companies

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Abstract

The circular economy model is a fairly new development model of the economy, in which a circular or circular model of resource management, product use, and striving for the concept of creating minimal waste is established. In the circular economy model, it is necessary to reduce waste to the smallest possible extent, and to increase the use of already used resources and products, in such a way that they are included again in the process of production and use. However, the transition to a circular economy model is a complex task and a big challenge, both on a micro level for individuals and on a macro level for companies and countries. The role of accounting and financing is increasingly appearing as a necessary factor for those companies that want to survive on the market and be competitive. Accounting and finance have the potential to drive and accelerate the transition towards the circular economy model. Through the development of accounting tools, it is possible to make measurements in the field of environmental protection in an easy way. Also, the role of accounting and responsibilities for the circular economy are of great importance in order for the economic gains from the transition to the circular economy model to be seen and measured in general. Through the literature, it could be noticed that there is little material about the role of accounting and financial resources in the business of companies in the very application of the principles and goals of the circular economy. This study aims to highlight the enormous future importance of the role of finance and accounting to facilitate the implementation of the principles and goals of the circular economy. A special review in the paper refers to the importance and role of financing and accounting that should be applied in companies that are just at the beginning, i.e. in the transition of applying and introducing the principles of the circular economy, which would greatly facilitate them this time, as well as the way of conducting their business.

Keywords: circular economy, accounting, financing, companies.

Značaj i uloga računovodstva i finansiranja u primeni cirkularne ekonomije u preduzećima

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Abstrakt

Model cirkularne ekonomije je prilično nov razvojni model ekonomije, u kome se uspostavlja kružni odnosno cirkularni model upravljanja resursima, korišćenja proizvoda, kao i težnja ka konceptu stvaranja minimalnog otpada. U modelu cirkularne ekonomije neophodno je svesti otpad na najmanju moguću meru, a povećati upotrebu već korišćenih resursa i proizvoda, na način tako što će ponovo biti uključeni u proces proizvodnje i upotrebe. Međutim, sam prelazak odnosno tranzicija na model cirkularne ekonomije predstavlja kompleksan zadatak i veliki izazov, kako na mikro nivou za pojedince, tako i na makro nivou za kompanije i države. Uloga računovodstva i finansiranja sve više se javlja kao neophodan faktor za one kompanije koje žele da opstanu na tržištu i budu konkurentne. Računovodstvo i finansiranje imaju potencijal da pokrenu i ubrzaju tranziciju. ka modelu cirkularne ekonomije. Kroz razvijanje računovodstvenih alata moguće je na lakši način vršiti merenja u oblasti zaštite životne sredine. Takođe, uloga računovodstva i odgovornosti za cirkularnu ekonomiju su od ogromnog značaja kako bi ekonomski dobici od tranzicije ka modelu cirkularne ekonomije uopšte bili sagledani i merljivi. Kroz literaturu se moglo primetiti da postoji malo materijala o tome kolika je uloga računovodstva i finansijskih sredstava u poslovanju kompanija u samoj primeni principa i ciljeva cirkularne ekonomije. Ova studija ima za cilj da ukaže na ogroman budući značaj uloge finansiranja i računovodstva kako bi se olakšala primena principa i ciljeva cirkularne ekonomije. Poseban osvrt u radu se odnosi na značaj i ulogu finansiranja i računovodstva koje treba primenjivati u preduzećima koja su tek na početku, odnosno u tranziciji primene i uvođenja principa cirkularne ekonomije, što bi im u mnogome olakšalo ovaj put, kao i način sprovođenja svog poslovanja.

Ključne reči: cirkularna ekonomija, računovodstvo, finansiranje, kompanije

1. Uvod

Ubrzani društveni i tehnološki napredak, globalizacija, industrijalizacija, a povrh svega i težnja čoveka za sve većim životnim potrebama i ostvarivanjem što većeg profita doveli su do degradacije životne sredine, kao i opstanka Planete. Današnje društvo je potrošačko društvo, a da bi se konstantne potrebe čoveka ispunile, sve više se koriste prirodni resursi, koji su nažalost, odavno u deficitu. Enormna proizvodnja proizvoda, koji ima sve kraći životni vek uglavnom povlači i stvaranje ogromnih količina proizvoda koji se odbacuju. Čovek je, tokom istorije, stvorio, a da o tome uopšte nije razmišljao ogromne količine otpada. Svakog dana u svetu, kako u naseljima, tako i u poljoprivrednim i urbanim područjima nastaju ogromne količine otpada, koje se jednostavno odbacuju, odnosno kojima se nažalost ne upravlja adekvatno. Ovakav model ekonomije je nazvan linerana ekonomija. Odavno je neophodno uspostavljanje adekvatnog sistema u oblasti zaštite životne sredine i u oblasti neracionalnog trošenja resursa, kako bi se ove negativne posledice svele na minimum. Od suštinskog je značaja da današnje društvo ograniči ekološku štetu koju stvara svojom konstantnom potrošnjom. Realan put za ograničavanje potrošnje bio bi prelazak na sistem u kojem se materijali čuvaju i kruže kroz privredu što je više moguće puta i što je sporije moguće, čime bi se u velikoj meri smanjili procesi ekstrakcije resursa, prerade resursa i upravljanja otpadom koji su intenzivni sa efektom staklene baste (Pratt, Lenaghan, & Mitchard, 2016).

Šansu za postizanjem ovakvih preokreta je moguće postići ukoliko se ekološka svet kod ljudi promeni, kao i boljem korišćenju prirodnih resursa, posebno otpada. Model cirkularne ekonomije funkcioniše po principu vraćanja vrednosti proizvodu, kroz produženje veka trajanja kroz popravke, reciklaže, ponovno korišćenje. Osnovna suština ovog modela je da se proizvod koji izgubi namenu u jednom smislu, ponovo vrati u proces proizvodnje, kako bi imao ponovo upotrebnu vrednost. Međutim, sam prelazak odnosno tranzicija na model cirkularne ekonomije predstavlja kompleksan zadatak i veliki izazov, kako na mikro nivou za pojedince, tako i na makro nivou za preduzeća i države. Uloga računovodstva i finansija se sve više se javlja kao bitan faktor za

ona preduzeća koja, kako bi opstala na tržištu i bila konkurentna, moraju sve više pažnje i svojih aktivnosti usmeravati na održivo poslovanje. Uključivanje i razvijanje računovodstvenih alata i praksi u ona preduzeća koje svoje poslovanje žele da promovišu i kroz ekonomsku, ali isto tako i ekološku dobit, je u mnogome pomoglo da se olakša sam proces uspostavljanja principa i modela cirkularne ekonomije.

Ova studija ima za cilj da ukaže na ogroman budući značaj računovodstva i finansija i njihove primene kako bi se ispunili principi i ciljevi cirkularne ekonomije, pogotovo u preduzećima. Takođe, cilj studije je da ukaže na neraskidiv odnos korišćenja i razvijanja računovodstvenih i finansijskih alata, koji bi kompanijama olakšali poslovanje, ali i samu tanziciju primene modela cirkularne ekonomije, a preduzećimabi to donelo višeruku korist i profit.

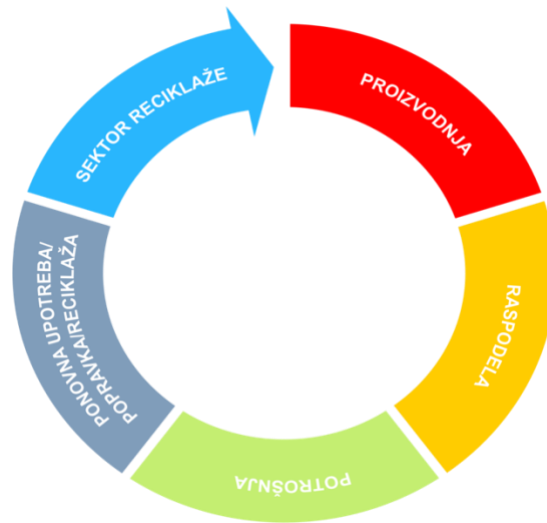
Struktura rada je sledeća: Nakon Uvoda, Poglavlje dva se odnosi na pojam i osnovne karakteristike modela cirkularne ekonomije. Poglavlje tri se odnosi na uticaj finansijskih i računovodstvenih izveštavanja primenjenih na cirkularnu ekonomiju. Poglavlje četiri na značaj finansijskog i računovodstvenog aspekta za uvođenje cirkularne ekonomije u preduzeća. Poslednje poglavlje se odnosi na zaključna razmatranja i određene komentare i preporuke.

2. Pojam i osnovne karakteristike modela cirkularne ekonomije

Ono što je karakteristično za linearni ekonomski sistem, jeste činjenica da je to model ekonomije koji iziskuje konstantni ekološki tok ekstrakcije, proizvodnje i upotrebe, odlaganja materijala i energije (Korhonen, Honkasalo, & Seppälä, 2018), kao i odbacivanja svega navedenog i samim tim dovodi do ugrožavanja, kako životne sredine, tako i opstanka ljudi. Privreda razvijenijih zemalja Evropske unije se poslednjih godina sve više udaljava od ovakvog modela ekonomije. Cirkularna ekonomija predstavlja koncept stvaranja vrednosti kroz racionalno korišćenje resursa i minimiziranje negativnog uticaja proizvedenih proizvoda na životnu sredinu u svim fazama životnog ciklusa proizvoda, koji omogućavaju ponovnu upotrebu korišćenih materijala, kao i promovisanje koncepta ublažavanja štetnog uticaja proizvoda na životnu sredinu koje proizvode kompanije (Seroka-Stolka, & Ociepa-Kubicka, 2019).

Model cirkularne ekonomije, se za razliku od sadašnje linearne ekonomije, smatra održivim ekonomskim sistemom u kojem je ekonomski rast odvojen od upotrebe resursa, kroz smanjenje i recirkulaciju prirodnih resursa (Corona, Shen, Reike, Carreón, & Worrell, 2019). Za razliku od linearnog modela ekonomije, cirkularna ekonomija je promovisana kao pristup održivog razvoja koji ne ugrožava ekonomski rast (Pratt, Lenaghan, & Mitchard, 2016; Aranda-Usón, Portillo-Tarragona, Marín-Vinuesa, & Scarpellini, 2019) i kao takva, ovaj model ekonomije predstavlja jedan od imperativa održivog razvoja proizvodnje i društva u celini (Vegeera, Malei, Sapeha, & Sushko, 2018), tako da se očekuje se da će upravo optimalan put ka održivom razvoju, predstavljati cirkularna ekonomija (Corona, Shen, Reike, Carreón, & Worrell, 2019). Prema autorima Iung i Levrat (2014) koncept cirkularne ekonomije je zasnovan na konceptima zelene ekonomije koji obuhvata i ekonomski koncept, a sve u svrhu postizanja održivog razvoja, kao i eliminacije nastanka otpada. Kao posledica primene modela cirkularne ekonomije, ostvaruju se i ekonomske koristi, ljudsko blagostanje i kulturni preokret na paradigmu održivosti, ne samo uticaj na životnu sredinu (Geng, & Doberstein, 2008; Milanović, Petković, & Jovanović, 2019). Ova strategija razvoja, prema autorima Hislop i Hill (2011) se fokusira na maksimiziranje efikasnosti resursa i minimiziranje proizvodnje otpada, čime održava vrednost proizvoda, materijala i resursa u privredi što je duže moguće (EC, 2015; Milanović et al., 2022). Cirkularni model ekonomije je predstavljen na Slici 1.

Kao što se može videti na Slici 1. model cirkularnog poslovanja predstavlja zatvoreni kružni proces, u kome je svaki proces i aktivnost pažljivo praćena, počevši od procesa proizvodnje, preko raspodele, potrošnje, ponovne upotrebe, popravke i reciklaže, pa na kraju do sektora reciklaže i povraćaja u ponovni proces proizvodnje. Zatvoreni krug predstavlja simbol iskorišćenja svake materije i resursa u navedenim procesima, kao i to da ne postoje ostaci ili da ukoliko postoje, da se bar svedu na minimum.



Slika 1: Cirkularni model ekonomije
Izvor: (OEBS, 2019)

3. Uticaj finansijskih i računovodstvenih izveštavanja primenjenih na cirkularnu ekonomiju

Model cirkularne ekonomije, kao jedan od imperativa održivog razvoja proizvodnje i društva u celini, postavio je nove izazove u postojećem računovodstvenom sistemu (Vegea, Malei, Sapeha, & Sushko, 2018), ali i planiranje finansijskih resursa, koji su neophodni kako bi se sistem tranzicije i primene cirkularne ekonomije postigao. U savremenim uslovima tranzicije od industrijske ka postindustrijskoj ekonomiji, problem održavanja povoljne životne sredine i racionalnog korišćenja prirodnih resursa zahteva adekvatnu transformaciju računovodstvenih metodologija, orijentisanih na reprodukciju i održivo korišćenje prirodnih resursa, a ne na maksimalan prihod od njihove eksploatacije (Vegea, Malei, Sapeha, & Sushko, 2018). Ozbiljnim preprekama za postizanje tranzicije ka cirkularnoj ekonomiji se smatraju nedostatak i loše procene finansijskih ulaganja u koncept kružnog, odnosno cirkularnog poslovanja, kao i rizici neosnovanog ulaganja (EC, 2016). Kada se na ovo dodaju i problemi kao što su: nedostatak finansijskih resursa i neadekvatna finansijska šema, može se zaključiti da sve zajedno uzrokuje sporije usvajanje i uvođenje cirkularne ekonomije (Ormazabal et al., 2018; Milanović, Petković, & Jovanović, 2019).

Obezbeđivanje finansijskih resursa i računovodstvenih izveštavanja je neophodno kako bi se zadaci koje povlači model cirkularne ekonomije sproveli na najbolji mogući način. Stoga nema sumnje da cirkularni poslovni modeli zahtevaju prilagođene finansijske mehanizme, ali i razvijanje računovodstvenih alata, kako bi se pravovremeno dobijali izveštaji o trenutnom stanju primene modela cirkularne ekonomije i njenih ciljeva. U Tabeli 1. prikazani su finansijski resursi, koji su primenjeni na cirkularnu ekonomiju.

Kao što se može videti u Tabeli 1. Primenljivost finansijskih resursa na cirkularnu ekonomiju je od izuzetnog značaja. Kako bi se obezbedila potpuna primena principa i ciljeva cirkularne ekonomije, neophodno je obezbediti kvalitet, raspoloživost, izvore finansijskih resursa, kao dalja ulaganja u energetska valorizaciju, obnovljive izvore i eko-inovacije. Tek onda kada se uspostavi stabilan finansijski aspekt, može se očekivati i razvijanje računovodstvenih alata i izveštaja. Analiza računovodstvenih i finansijskih izveštaja treba da se sprovodi sa svrhom unapređivanja realizacije ekonomskih i finansijskih resursa na primenljivost i oblast cirkularne ekonomije, kako bi se njeni principi lakše uspostavili i što pre doprineli celokupnoj uspešnosti prilikom tranzicije primene, ali i potpunog potencijala koji je omogućen modelom cirkularne ekonomije.

Tabela 1. Različite karakteristike finansijskih resursa primenjenih na cirkularnu ekonomiju

Finansijski resursi	Primenjivost/ Oblast
Kvalitet "finansijskih resursa za cirkularnu ekonomiju .	Garancije potrebne za cirkularnu ekonomiju.
	Troškovi spoljnih sredstava za cirkularnu ekonomiju.
„Raspoloživost” finansijskih sredstava za dostupnost cirkularne ekonomije.	Raspoloživost finansijskih sredstava u vidu kapitala kao ograničenja.

	Nesigurnost neizvesnost u vezi sa novčanim tokovima dobijenim od ulaganja u cirkularnu ekonomiju.
Izvor finansijskih sredstava za investicije cirkularne ekonomije.	Finansiranje iz sopstvenih sredstava kompanije („kapitalski fondovi”).
	Podsticaji i javna sredstva itd.
Ulaganja u energetska valorizaciju i obnovljive izvore	Finansijski aspekti ulaganja u energetska privatizaciju i obnovljive izvore.
Ulaganja u eko-inovacije	Investicije u inovativna rešenja za smanjenje uticaja kompanije na životnu sredinu.
	Ulaganja u istraživanje i razvoj životne sredine (unutrašnja spoljna) za ekološke inovacije.

Izvor: Milanović, Petković, & Jovanović, 2019.

4. Značaj finansijskog i računovodstvenog aspekta za uvođenje cirkularne ekonomije u preduzećima

Koncept cirkularne ekonomije privlači sve veću pažnju vlada, naučnika, kompanija i građana kao neophodan korak za postizanje održivog razvoja (Corona, Shen, Reike, Carreón, & Worrell, 2019). Poslednjih godina akademici su analizirali brojne studije slučaja cirkularne ekonomije u poslovanju u uvođenju ovog modela u okviru preduzeća (Aranda-Usón, Portillo-Tarragona, Marín-Vinuesa, & Scarpellini, 2019). Međutim, neke oblasti istraživanja su u dosta manjoj meri istražene, pogotovo na mikro nivou, nivou preduzeća kao što je proučavanje karakteristika finansijskih uticaja (Aranda-Usón, Portillo-Tarragona, Marín-Vinuesa, & Scarpellini, 2019), ali i razvijanja računovodstvenih alata, kako bi se konstantno izveštavao i pratio tok primene cirkularne ekonomije u poslovanjima preduzeća.

Računovodstvo i finansiranje predstavljaju katalizatore za napredovanje kružnih preduzeća i ključni su za pokretanje održivog razvoja (Fischer, Geusebroek, Nusseck, 2022). Redefinisanje vrednosti, uticaja i rizika za ubrzanje kružne tranzicije, skaliranje kružnih poslovnih modela je put ka ubrzanju tranzicije ka cirkularnoj ekonomiji, a samim tim i obezbeđivanju profitabilnosti preduzeća u svetu koji se brzo menja (Fischer, Geusebroek, Nusseck, 2022).

Do sada, u tradicionalnom finansijskom računovodstvu, koje se odnosilo na linearni model ekonomije, vrednost kružnog uticaja nije dovoljno razmatran (Accounting, 2021). Razlog tome je to što se finansijska praksa izveštavanja ograničila samo na one finansijske i računovodstvene izveštaje koje su obuhvatale poreklo u linearnim poslovnim modelima, ne uzimajući u obzir eksterne troškove i koristi (Accounting, 2021). Takođe, rezultati ovakvih izveštaja zanemaruju uticaje nefinansijskih aspekata, kao što je iscrpljivanje resursa, klimatske promene i drugo, dok se fokusiraju samo na unutrašnjost preduzeća i ostvarivanje profita. Kako bi opstala, a i dalje se razvijala u 21. veku, preduzeća moraju da mere više od samog finansijskog uticaja, a računovođe treba da uspostave nove kružne računovodstvene pristupe kako bi razvile vrednost cirkularnih poslovnih modela i pomogle kružnim poslovnima da zažive i budu uspešni (Fischer, Geusebroek, Nusseck, 2022). Merenje različitih aktivnosti koje sprovode firme koje su povezane sa cirkularnim modelom daje preliminarnu perspektivu za napredak ka modelu cirkularne ekonomije u preduzećima, tako što se definišu aktivnosti koje utiču na kružni obim preduzeća. Ovi rezultati pokreću dvostruku liniju ispitivanja o merenju kružnog obima poslovanja, s jedne strane, i specifičnim investicijama koje se moraju primeniti na cirkularnu ekonomiju kao jedinstveni i neponovljivi resursi svake kompanije (Aranda-Usón, Portillo-Tarragona, Marín-Vinuesa, & Scarpellini, 2019).

5. Zaključna razmatranja

Cilj ove studije je da se ukaže na ogroman budući značaj računovodstva i finansija i njihove primene kako bi se ispunili principi i ciljevi cirkularne ekonomije, pogotovo u preduzećima, kako bi im se olakšalo poslovanje, ali i tranzicija primene modela, što bi im donelo višeruku korist i profit. Neophodnost definisanja o tome koje resurse preduzeća treba da koriste kako bi zatvorilo petlje i bili konkurentniji, zatim izbor finansijskih sredstava koja su potrebna za ulaganje u kružna inovativna rešenja (Aranda-Usón, Portillo-Tarragona, Marín-Vinuesa, & Scarpellini, 2019) i razvijanje računovodstvenih alata i metoda, na osnovu kojih bi se izveštavale sve promene koje su moguće, u mnogome bi doprinelo konkurentnosti kompanija, a i šire. Međutim, trenutni izazovi u vezi sa računovodstvom i finansiranjem cirkularnog poslovanja, predstavljaju jednu od niza prepreka sa kojima se susreću mnoge kompanije. Ove prepreke mogu dovesti do sprečavanja usvajanja novih načina izveštavanja, čime bi na tržištu ovakva preduzeća u startu zaostajala za onima koji su svoje poslovanje unapredili kroz nove alate i načine finansiranja. Trenutne računovodstvene prakse su zastarele i “ograničene” za cirkularne poslove i samim tim stvaraju prepreke za kompanije koje žele da implementiraju kružna rešenja.

Kao buduće preporuke mnogim kompanijama, ulaganje u postavljanje stabilnog računovodstvenog i finansijskog sektora, bi trebalo da predstavlja jedno od prioritetnijih zadataka. Na ovaj način bi se doprinelo kvalitetu sopstvenih finansijskih sredstava, zatim ubrzala dostupnost sredstava, kao i praćenje tokova materijala neophodnih prilikom prelaska na model cirkularne ekonomije. Istovremeno, ulaganjem u stabilnost finansijskog i računovodstvenog sektora, pozitivno će uticati i na stimulisane sprovođenja inicijativa cirkularne ekonomije u preduzećima, a i šire. Uvođenje računovodstvenih praksi će svakako uticati na brzinu i dostupnost neophodnih podataka uz pomoću kojih će svakako moći da se obezbedi postizanje napretka u oblasti i primeni ciljeva i principa modela cirkularne ekonomije.

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Forensic Accounting Aspect of the Fight Against Corruption

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Abstract:

The world economy in the last decade has been marked by major financial scandals of companies that were caused by various forms of criminal acts. Experience has shown that corruption and all other criminal acts lead to damages that sometimes reach unfathomable proportions, not only for the national, but also for the international economy. Corruption is a pervasive global problem that threatens public finances, legal order, social prosperity and social security. As a socially negative phenomenon, corruption in the public sector is considered one of the biggest problems that directly undermines the stability of public finances and the functioning of the public sector in general, and therefore the economic stability of the country as a whole. Standard mechanisms for the prevention of systemic corruption, among other things, include various types of public supervision and control in the public sector, which are aimed at building an efficient and effective system of managing public funds.

In recent years, special emphasis in the fight against corruption has been placed on the role of police and investigative bodies and prosecutors' offices as bodies primarily focused on repression and on strengthening cooperation between those and bodies primarily focused on prevention in the system. The origin and development of forensic accounting is in the function of detecting all forms of criminal acts, including corruption. The methodology of forensic accounting is specific, multidisciplinary, and as such occupies an important place in the system of prevention and investigation of criminal acts. Difficulties in detecting and proving criminal acts, especially corruption, necessitate the development of specific methods and techniques for their detection and identification from the spectrum of forensic disciplines.

Keywords: socially negative phenomenon, corruption, forensic accounting, disclosure.

Forenzičko računovodstveni aspekt borbe protiv korupcije

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Abstract

The world economy in the last decade has been marked by major financial scandals of companies that were caused by various forms of criminal acts. Experience has shown that corruption and all other criminal acts lead to damages that sometimes reach unfathomable proportions, not only for the national, but also for the international economy. Corruption is a pervasive global problem that threatens public finances, legal order, social prosperity and social security. As a socially negative phenomenon, corruption in the public sector is considered one of the biggest problems that directly undermines the stability of public finances and the functioning of the public sector in general, and therefore the economic stability of the country as a whole. Standard mechanisms for the prevention of systemic corruption, among other things, include various types of public supervision and control in the public sector, which are aimed at building an efficient and effective system of managing public funds. In recent years, special emphasis in the fight against corruption has been placed on the role of police and investigative bodies and prosecutors' offices as bodies primarily focused on repression and on strengthening cooperation between those and bodies primarily focused on prevention in the system. The origin and development of forensic accounting is in the function of detecting all forms of criminal acts, including corruption. The methodology of forensic accounting is specific, multidisciplinary, and as such occupies an important place in the system of prevention and investigation of criminal acts. Difficulties in detecting and proving criminal acts, especially corruption, necessitate the development of specific methods and techniques for their detection and identification from the spectrum of forensic disciplines.

Keywords: socially negative phenomenon, corruption, forensic accounting, disclosure.

1. Introduction/ UVOD

Krupni poremećaji na regionalnim tržištima kapitala manifestovali su ozbiljne monetarne potrese i to naročito kod zemalja u razvoju.

Danas krivična dela privrednog kriminaliteta, a posebno koruptivna krivična dela (primanje i davanje mita, zloupotreba službenog položaj i dr.), sasvim sigurno, predstavljaju globalni fenomen i jedan su od najvećih problema i izazova sa kojim se suočava savremeno društvo.

Korupcija je prisutna u svim zemljama sveta, bez obzira na njihovo ekonomsko, društveno ili političko uređenje, tako da postoji i u najrazvijenijim državama. U cilju sprečavanja da različite forme podmićivanja postanu dominantan oblik društvenih odnosa, potrebno je uspostaviti adekvatne mehanizme delovanja društva u suprotstavljanju ovoj društveno neprihvatljivoj pojavi – “rak rani” svakog društva.

Iako je korupcija veoma stara pojava, korpus teorijskih i empirijskih istraživanja o korupciji značajno je porastao u ovoj deceniji. Finansijski i visokotehnološki kriminal postaju sve složeniji, a to su dela poput falsifikovanja valuta, pranja novca, kriminala vezanog za intelektualnu svojinu, prevara sa platnim karticama, napada kompjuterskih virusa i sajber terorizama, i ona mogu da u velikoj meri negativno utiču na sve nivoe društva. Efikasnoj borbi u prevenciji prevara, ali i njihovom detektovanju veliki doprinos mogu dati forenzičke računovođe. Profesiji forenzičkog računovođe još uvek nije data dovoljna pažnja praktičara u nacionalnim okvirima.

Forenzičko računovodstvo deo je ukupnog procesa istraživanja kriminalnih radnji. Za otkrivanje i dokazivanje kriminalnih radnji potrebno je specifično znanje i iskustvo, odnosno potrebni su specijalisti koji poznaju tehnologiju i način poslovanja u pojedinim oblastima, kao i propise koji ih regulišu, a zatim i pojavne oblike prevarnih radnji kao i metodiku njihovog dokazivanja.

Ideja o uvođenju forenzičkog računovodstva zasniva se na razmišljanju da bi bilo svrsishodno uspostaviti jednu potpuno novu javnu funkciju - forenzičko računovodstvo, kojim bi se bavila lica sa specifičnim veštinama, bez kojih očigledno nije moguće napraviti kvalitetan spoj između prevencije i represije. Razvojem forenzičkog računovodstva unapređena su specijalizovana znanja i veštine, neophodna za efikasnije sprečavanje i suzbijanje prevara. Ono podrazumeva primenu svih računovodstvenih, revizorskih i drugih

finansijskih veština i znanja u razjašnjavanju odnosa, činjenica i ekonomskih transakcija koje mogu biti, ili su već predmet sudskog postupka.

U radu je u sklopu prvog dela, definisan pojam forenzičkog računovodstva, njegov nastanak i razvoj. Nakon toga, su obrađeni delokrug i vrste forenzičkog računovodstva. Dalje, sledi odgovor koji su ciljevi i zadaci kao i mogući modeli forenzičkog računovodstva. Takođe, u prvom delu rada obrađeni su forenzički alati koje koriste forenzičke računovođe. U okviru drugog dela rada, date su najčešće definicije kriminalnih radnji koje se koriste u teoriji i praksi, zatim njihova klasifikacija i razvoj. U sklopu trećeg dela rada, prezentovane se neke od definicija korupcije, gde treba napomenuti na činjenicu da "postoji onoliko definicija korupcija koliko postoje ljudi - istraživači koji se bave ovim fenomenom. Nakon toga obrađene su vrste odnosno pojavni oblici korupcije prema stablu kriminalnih radnji date od strane ACFE. Takođe u sklopu ovog trećeg dela rada, prezentovani su opšti standardi borbe protiv korupcije. Na kraju, rad u četvrtom delu, obrađuje proces forenzičkog istraživanja sa alatima koji se koriste i koji pomažu u istrazi.

Cilj rada je da ukaže na značajnost forenzičkog računovodstva u funkciji suzbijanja prevara, kao i da se ukaže na neophodnost njegovog daljeg usavršavanja i razvoja. Praktični cilj naučnog rada usmeren je na pokušaj autora da forenzičko računovodstvo promovise kao profesiju savremenog doba.

1. Definisane, klasifikacija i razvoj kriminalnih radnji

1.1 Definisane i klasifikacija kriminalnih radnji

Kriminalna radnja, podrazumeva element iznenađenja, trik, lukavstvo, nepoštene načine putem kojih se drugi mogu prevariti, a jedine granice u njenom definisanju su one koje postavlja ljudsko nepoštenje. Kriminalna radnja u suštini uključuje raznovrsne načine prevare koje ljudski um može da osmisli, kojima se pojedinci služe kako bi nad drugima ostvarili prednost kroz lažne tvrdnje. U savremenom smislu, kriminalne radnje uključuju nepoštenje u obliku namernog obmanjivanja ili namernog lažnog predstavljanja materijalnih činjenica. U Međunarodnim standardima revizije prevare, odnosno kriminalne radnje se definišu kao nameran akt koji je izvršen od strane jednog ili više lica, iz redova uprave, zaposlenih ili trećih lica, koji ima za posledicu prezentaciju netačnih informacija u finansijskim izveštajima. Postoje dve osnovne kategorije kriminalnih radnji:

1. **Malverzacije ili prevare** – namerno izvedena obmana s ciljem obezbeđenja nepravedne ili protivzakonite koristi,

2. **Kriminalne radnje u finansijskim izveštajima** (tzv. kriminal belog okovratnika, white collar crime)

U postupke koji se kvalifikuju kao prevare, odnosno kriminalne radnje ubrajaju se: *manipulacija, falsifikovanje ili izmena dokumenata i evidencije, protivpravno prisvajanje sredstava, sprečavanje ili propuštanje evidentiranja nastalih poslovnih događaja kako u dokumentaciji tako i u evidencijama, knjigovodstveno obuhvatanje događaja koji nisu nastali i pogrešna primena računovodstvenih politika.*

U literaturi se često upotrebljava termin **kriminalitet belog okovratnika**. Sutherland navodi da se kriminalitet belog okovratnika najčešće *ispoljava u vidu lažnog prikazivanja finansijskih izveštaja korporacija, manipulacijama na berzi, komercijalnim podmičivanjem ili podmičivanjem javnih funkcionera na direktan ili indirektan način, sa ciljem da se obezbede povoljni ugovori i usvajanje željenih propisa; zatim u vidu obmanjujućeg reklamiranja i prodaje, pronevera i nenamenskog korišćenje sredstava fondova, utaje poreza, zloupotrebe prilikom korišćenja sredstava prinudnih i stečajnih fondova.*

Postoji više načina na koji se mogu podeliti kriminalne radnje. Jedan od njih se može odnositi na to **da li je kriminalna radnja izvršena protiv ili u ime organizacije**. Na primer, ukoliko je zaposleni izvršio određenu kriminalnu radnju na štetu organizacije u kojoj je zaposlen, žrtva je u tom slučaju, sam organizacija i ista je izvršena protiv organizacije. Međutim, ukoliko se radi o lažnom finansijskom izveštavanju, onda uprava obično počinu kriminalnu radnju u ime same organizacije kako bi prikazala njeno finansijsko stanje obično boljim nego što jeste. Iako postoji više načina i kategorizacija kriminalnih radnji, u literaturi se često sreću sledeće osnovne grupe prema:

- **Izvršiocima kriminalnih radnji**
- **Odredbama krivičnog zakonodavstva**
- **Ciklusima u računovodstvu**
- **Pojavnim oblicima i načinu izvršenja kriminalne radnje**

Kriminalne radnje su najčešće dobro osmišljene i prikrivene jer izvršioци istih nastoje da prikriju tragove o njihovim nezakonitim postupcima. Ipak, poznato je da ne postoji savršen zločin, i shodno tome, svaka kriminalna radnja uvek ostavlja neki trag. Pitanje je samo sposobnosti uočavanja pojedinih indicija i tzv. "crvenih zastavica", koje mogu ali i ne moraju uvek biti znak izvršenja kriminalnih radnji. U tom smislu „crvene zastavice“ mogu ukazati da na prvi pogled „nešto nije u redu“ i ukazati na prve nagoveštaje o mogućim kriminalnim radnjama. Kada se govori o „crvenim zastavicama“ tada se misli na brojne situacije ili uslove koji mogu biti faktori koji ukazuju na već postojanje kriminalnih radnji, ili pak govori o uslovima koji pogoduju njihovom nastanku.

Zanimljiva je podela koja ima karakterističan oblik koji je nazvan „**Stablo kriminalnih radnji**“ a data je od *Asocijacije ovlašćenih istraživača prevara - ACFE*. Na stablu profesionalnih prevara, podela je izvršena kroz tri osnovne grupacije koje se dalje raščlanjuju, a to su:

1. Korupcija;
2. Protivpravno prisvajanje sredstava;
3. Manipulativni ili lažni finansijski izveštaji.

Naime, ACFE vrši podelu prema tzv. **profesionalnim prevarama (Occupational fraud)**. Ova vrsta prevare uključuje upotrebe nečijeg profesionalnog zanimanja u svrhe ličnog bogaćenja, kroz namernu zloupotrebu sredstava ili imovine organizacije i može biti počinjena je od strane uprave ili zaposlenih. Zapravo, profesionalna prevara uključuje četiri osnovne kategorije a to su: *tajnost, kršenje fiducijarnih obaveza zaposlenih u organizaciji, sticanje direktne ili indirektno finansijske koristi zaposlenog i na kraju prouzrokuje štetu za samu organizaciju.*

Model koji ACFE koristi za kategorizovanje poznatih kriminalnih radnji naziva se **stablo kriminalnih radnji** (slika 2). U njemu se pojedinačne kriminalne šeme klasifikuju po kategorijama, podkategorijama i mikrokategorijama. Temeljno poznavanje kategorija i njihovih specifičnosti je presudno za uspešno otkrivanje i sprečavanje kriminalnih radnji.

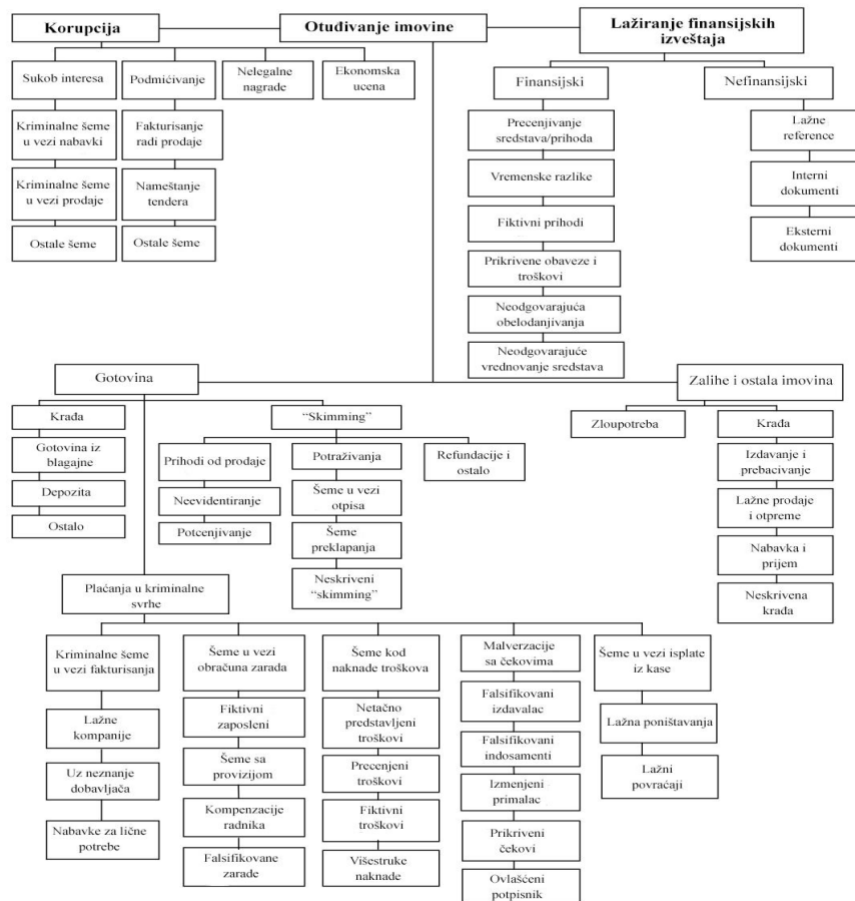


Figure 2. Stablo kriminalnih radnji

Na osnovu zaključaka i istraživanja nastalih u ove tri kategorije, zaključuje se, da je potrebno uključiti u podelu i termin informatička ili sajber prevara. Nove informacione tehnologije se takođe koriste i u vršenju starih pojavnih oblika kriminalnih radnji sa stabla kriminalnih radnji - tradicionalnih inkriminiranih radnji: korupcija, protivpravno prisvajanje sredstava i manipulativni ili lažni finansijski izveštaji.

1.2 Razvoj/evolucija kriminalnih radnji

Da bi se određena kriminalna radnja u organizaciji dogodila, pored aktera u njoj potrebno je vreme i sled aktivnosti koji je čine. Sve navedeno čini proces. Svaki proces čini nekoliko faza, pa je tako i za kriminalnu radnju potreban određeni razvoj, odnosno sled koraka ili faza koje je čine. Pomenute faze razvoja kriminalnih radnji mogu se definisati na sledeći način:

1. Motivacija da se osoba odluči na kriminalnu radnju. Ona može imati razne motive poput ličnog interesa, osvete motivisane nanošenjem štete drugima, itd.
2. Pritisak od strane nadređenih opstruisanjem svakog pokušaja da se proces dovede u red do krajnjeg naredbodavnog pritiska da se kriminalna radnja sprovede u delo.
3. Izbegavanja primene zakonske regulative.
4. Izbegavanje donošenja internih akata kojima se uređuje poslovanje organizacije.
5. Izbegavanje, odnosno odlaganje pisanja procedura i uputstava kojima bi se uredili procesi u organizaciji.
6. Nepostojanje internih kontrola u organizaciji ili postojanje slabog kontrolnog okvira u njoj.
7. Ne sprovođenje nijednog vida kontrole procesa rada i procesnih aktivnosti.
8. Nepostojanje etičkog kodeksa
9. Lažna opravdanja (lažno formulisanje namere) kriminalne radnje kao trenutne pozajmice koja će biti vraćena.
10. Izvršenje kriminalne radnje.
11. Prikrivanje kriminalne radnje.
12. Znaci upozorenja na kriminalnu radnju u organizaciji – otkrivena su odstupanja, postoje pretpostavke, kod počinioca je primećena promena u obrascu ponašanja.
13. Na osnovu dojave, interne kontrola, slučajnog otkrivanje, interne revizije, otpočinje proces revizije.
14. Započinje se istraga – prikupljaju se dokazi, gubitak sredstava je potvrđen i dokumentovan, ispituju se treća lica i određeni zaposleni, osumnjičeni.
15. Preduzimaju se određene mere.
16. Dolazi do sudskog procesa

2. Korupcija - fenomen i izazov savremenog društva

2.1 Korupcija – pojam i priroda

Nema društva odnosno zemlje koja je u potpunosti oslobođena korupcije. Postoje, međutim, primetne razlike između nivoa prihvatanja korupcije od zemlje do zemlje. Ipak, ono što je svima zajedničko jeste da je u svakoj od njih korupcija definisana odnosno žigosana u domaćoj kulturi – što se, na primer, vidi već iz činjenice da je u većini zemalja borba protiv korupcije danas zakonski uobličena. Već i samo to što je upotreba reči „korupcija” toliko učestala, dokaz je stigma kojom je ona obavijena. To je reč koja se veoma spremno koristi za opisivanje veoma širokog dijapazona situacija. Ovaj vid profesionalne kriminalne radnje najčešće se dešava u javnom sektoru.

Termin korupcija (lat.) označava duhovnu i moralnu pokvarenost, potpuno zanemarivanje časti i dostojanstva, nuđenje ili primanje novca da se ne bi ispunila neka dužnost, ili da bi se postupilo protivno savesti. Korupcija se najčešće pojavljuje bez pisanih tragova u računovodstvenoj i ostaloj poslovnoj dokumentaciji kojom bi se mogla dokazati.

Pojam korupcije se u različitim pravnim sistemima definiše na različit način ali se najčešće koristi definicija Svetske banke, koja korupciju **definiše kao zloupotrebu javnih resursa zarad ličnih interesa**. Korupcija se razvija tamo gde je sloboda poslovanja ograničena, gde postoje velika diskreciona ovlašćenja u donošenju odluka, nedostatak odgovornosti odgovornih lica, neefikasan sistem internih kontrola ili manjak transparentnosti u aktivnostima institucija koje koriste javna sredstva ili imovinu.

Mnogi autori smatraju da je najsveobuhvatnija definicija korupcije ona koju je predložio **Vito Tanci**. Prema ovoj definiciji: „Korupcija predstavlja namerno narušavanje principa nepristrasnosti pri donošenju odluka, a sve sa ciljem da se prisvoje neke pogodnosti.“

Kazneno – pravno definisanje korupcije vezuje se, pre svega, za određivanje krivičnih radnji, odnosno, zakonskog određenja korupcije. OECD je 2007. godine sprovela svetsko istraživanje o međunarodnim kazneno-pravnim standardima u vezi sa korupcijom. Ovo istraživanje proizašlo je iz tri temeljne konvencije (Civil law convention on corruption iz 1999; Criminal law convention on corruption iz 1999. i Convention on combating bribery of foreign public officials in international business transactions iz 1999.). Rezultati istraživanja su pokazali da je, većini slučajeva, korupcija određena kao neki od oblika potkupljivanja. Države članice konvencije imaju u nacionalnom zakonodavstvu, pre svega, sledeće oblike korupcijskih krivičnih dela: primanje mita (pasivni oblik podmićivanja), davanje mita (aktivni oblik podmićivanja), podmićivanje stranih javnih službenika, primanje i davanje nedozvoljenih poklona. Među druga korupcijska krivična dela, prema rezultatima istraživanja OECD, spadaju još i: pranje novca, zloupotreba službenog položaja ili radnih prava, tj. funkcije, pronevera, nezakonito posredovanje, krijumčarenje, nezakonito bogaćenje, te krivično delo zloupotrebe računovodstvenih standarda.

Za spomenuta krivična dela na svetskom nivou odgovorne su, kako fizička, tako i pravna lica, a određene sankcije su različite. OECD navodi da države imaju različitu zaštitu za navedena krivična dela (radno-pravne sankcije – gubljenje posla), administrativne,

tj. prekršajne sankcije (novčane 24 kazne, izuzimanje iz postupaka), civilno-pravne (zamrzavanje finansijskih sredstava koja su stečena korupcijom) i zatvorske kazne. Države potpisnice pomenutih konvencija su morale, na osnovu ocene međunarodnih organizacija, implementirati navedene standarde, pri čemu su to učinile na različite načine i u različitom obimu.

Nasuprot prilično jedinstvenog definisanja korupcije u kazneno-pravnom smislu, postoji veliki broj različitih definicija društvenih nauka. „O korupciji govorimo onda, kada neko krši pravila igre, koja nisu bila unapred definisana“ ili „korupcija znači da je novac, koji bi bio dostupan vladi za najrazličitije državne projekte, kanalisano u džepove pojedinaca“. Duine smatra da je korupcija nepravilnost u procesu odlučivanja, koji utiče na sadržaj odluke, da neko nešto uradi u zamenu za nagradu, ili obećanje nagrade takve vrste, koja ne može biti smisljeno obrazložena i u skladu sa odlukom i ulogom odlučioaca. Nadalje, Lasthuizen, Huberts i Kaptein korupciju definišu kao nedovoljnu upotrebu moći javnih službenika, te osoba povezanih sa njima, koje na nezakonit način imaju korist ili je, kako kažu, to zloupotreba javne službe u lične svrhe. Bruner i Džonston daju sličnu definiciju i opisuju korupciju kao zloupotrebu javnog položaja ili funkcije ili javnih resursa u lične svrhe. Naročito naglašavaju da su pojmovi zloupotreba, javno, lično i korist neprekidno u debatama svetskih naučnika sa aspekta pojave, ograničenja i smislenosti. Takođe smatraju da je korupcija negativna pojava sa sindromom razapetosti između bogatstva, moći, javnih i ličnih, te državnih i društvenih interesa.

2.2 Vrste/pojavni oblici korupcije

Prema stablu kriminalnih radnji postoje četiri vrste korupcije: sukob interesa, primanje mita, nelegalne strukture i iznuđivanje.

1. Sukob interesa, počinitelj ovog oblika korupcije koristi svoj uticaj da bi ostvario ličnu korist a samim tim i oštetio kompaniju. Korist koju ostvari možda nije vidljivo finansijska ali on svakako ostvaruje neku ličnu korist iz cele situacije. Sukob interesa, kao oblik korupcije, se često dešava u javnim nabavkama kroz preplaćivanje dobara, radova i usluga dobavljaču u kojem je odgovorno lice naručioca ostvarilo skriveno vlasništvo ili finansijski interes. Ovaj oblik korupcije se dešava i prilikom prodaje dobara i usluga od strane državnih organa i javnih preduzeća ispod tržišne cene ili bez naknade zbog skrivenog interesa. Na primer, rukovodilac može da odobri veće troškove od stvarno nastalih, prema određenom licu koje je zapošljeno, a to lice je takođe i lični prijatelj rukovodioca.

2. Podmićivanje nastaje kada se novac (ili nešto drugo od vrednosti) nudi kako bi se uticalo na određenu situaciju. Javlja se kada određena osoba na svoj zahtev ili voljom druge osobe uzme određenu vrednost da bi izvršila protivzakonitu radnju. U zavisnosti od predmeta podmićivanja razlikuju se administrativna (primalac je službeno lice poput zdravstvenih radnika, učitelja, profesora i dr.) i poslovna podmićivanja (menadžment ili drugi zaposleni u organizaciji zahteva određenu novčanu ili drugu vrstu nadoknade („procenat“) za pismenu realizaciju ugovora, ili dr. i za razliku od administrativne ima poslovno-komercijalnu konotaciju). Ovaj oblik korupcije uključuje nuđenje, davanje, primanje stvari velike vrednosti radi izvršenja uticaja na donošenje odluke. Na primer kada se raspisuje tender pa se želi da se ostvari prednost u odnosu na konkurenciju.

3. Nelegalne nagrade se podrazumeva uspostavljanje i održavanje veza sa uticajnim pojedincima u političkim strukturama, državnim organima i drugim oblastima društva, a što omogućava da se sa te pozicije mogu da vršiti razni uticaji na političke i državne organe. (Na primer na policiju, sudove i dr). Ovaj oblik korupcije uključuje davanje ili primanje stvari velike vrednosti kao nagrade za donete odluke.

4. Ekonomska ucena je pojam suprotan podmićivanju. Tu se ne nudi novac već se traži da bi se postigao određeni ishod. Ovaj oblik korupcije nastaje kada zaposleni zahteva plaćanje od dobavljača radi donošenja odluke u njegovu korist. Ukoliko dobavljač odbije da plati, doneta odluka će biti na njegovu štetu.

U zavisnosti od područja njenog pojavljivanja, korupcija se definiše i kao: administrativna, sistemska, preuzimanje (otimanje) države (state capture), politička korupcija, poslovna korupcija, odnosno korupcija u privredi.

2.3 Standardi borbe protiv korupcije

Fenomenu korupcija, koji izuzetno negativno utiče na stabilnost države, potrebno je prići planski, pri čemu je potrebno razviti sveobuhvatnu politiku borbe protiv korupcije. Da bi borba protiv korupcije bila uspešna, ona mora biti kontinuirana, planska i sistemska, jer opasnost od korupcije je latentna i mogućnost povratka u korupciju uvek postoji, posebno u državama koje su u tranziciji. Pri tome, potrebno je stalno imati na umu činjenicu da je korupcija dinamična, promenljiva i prilagodljiva pojava, koju je potrebno stalno istraživati, i u skladu sa tim blagovremeno vršiti izmene i dopune u zakonskim definisanjima konkretnih korupcijskih krivičnih dela. Jedan od najvažnijih zadataka jeste jačanje morala i svesti građana o štetnosti korupcije i potrebi da se uključe u njeno suzbijanje. Prave mere za suzbijanje korupcije moraju biti smislene i dugoročne.

Borba protiv korupcije sastavni je deo demokratizacije, modernizacije države i javne uprave, poštenih uslova utakmice u privređivanju, delovanja sudstva i zaštite prava i sloboda građana. Korupcija je opšte društveno zlo koje zahteva sistematski napor i visoki stepen mobilizacije svih društvenih snaga u njegovom suzbijanju. Glavni akteri suzbijanja korupcije su institucije civilnog društva koje treba da prepoznaju potrebe, institucije vlasti i uprave koje formulišu mere i različite nivoe državnih institucija koje nose odgovornost. Osim toga, borba protiv korupcije predstavlja borbu protiv nelegalnog delovanja u tržišnoj utakmici. To nelegalno delovanje suštinski predstavlja zaobilazanje pozitivnih propisa koji štite javno dobro. Učesnici u procesu korupcije usmereni su na povećanje privatne efikasnosti, a na štetu efikasnosti društva.

Borba protiv korupcije je veoma teška, a da bi borba bila efikasna, ona se mora razvijati kao i svaki drugi realni društveni proces. Ne postoje univerzalna gotova rešenja koje je potrebno samo primeniti u određenoj zemlji, jer su društveni sistemi, ma kako bili doktrinarno jednako zasnovani, specifični na svoj način, pa im se stoga na poseban način mora i pristupiti. Osnovni opšti standardi na kojima se zasniva borba protiv korupcije su:

- Kriminalizacija korupcije u domaćim i međunarodnim okvirima;
- Podsticanje nezavisnosti i samostalnosti institucija zaduženih za sprečavanje i borbu protiv korupcije;
- Istraga, gonjenje i suđenja za koruptivna krivična dela, uz obezbeđenje odgovarajućih finansijskih sredstava;
- Obezbeđenje efikasnih sredstava za prikupljanje dokaza;
- Specijalizacija lica ili organa zaduženih za borbu protiv korupcije uz adekvatnu obuku;
- Usvajanje odgovarajućih mera za oduzimanje imovine stečene koruptivnim delima;
- Sprečavanje zloupotrebe pravnih lica za prikrivanje krivičnih dela korupcije i
- Poboljšanje međunarodne saradnje u svim oblastima borbe protiv korupcije.

Rezolucija 97 (24)2 Komiteta ministara Saveta Evrope iz 1997. godine definiše dvadeset vodećih principa u borbi protiv korupcije. Najvažniji standardi sadržani u ovom dokumentu koji se odnose na korupciju u javnom sektoru su:

- Usvajanje odgovarajućih procedura revizije i njihova primena na organe državne uprave i javni sektor;
- Obezbeđivanje transparentnosti javnih nabavki i njihova adekvatna kontrola;
- Uspostavljanje sistema javne odgovornosti, i
- Obezbeđivanje da se u svakom aspektu borbe protiv korupcije uzmu u obzir moguće veze sa organizovanim kriminalom i pranjem novca.

Ono na čemu se u usvojenim standardima posebno insistira je uspostavljanje specijalizovanih organa radi efikasne prevencije i suzbijanja korupcije, kao i efikasna saradnja i razmena podataka između svih specijalizovanih organa i institucija koje su odgovorne za istragu i gonjenje krivičnih dela. Kao imperativni standard naznačena je i neophodnost oduzimanja imovine, odnosno imovinske koristi, stečene krivičnim delom.

3. Forenzičko računovodstvo - instrument otkrivanja i rasvetljavanja kriminalnih radnji

3.1 Pojam, nastanak i razvoj forenzičkog računovodstva

Forenzičko računovodstvo (forensic accounting) sastavni je deo poslovne forenzike. U praksi može biti primenjeno kao deo ukupne forenzike poslovanja, ali i kao samostalni deo istrage, u zavisnosti od želja naručioca. Poslovna forenzika pojavljuje se kao novo područje računovodstva s ciljem pronalaženja prevara i područja mogućih prevara u finansijskom poslovanju. Uz primarnu delatnost sprečavanja i otkrivanja prevara, poslovna forenzika bavi se determinisanjem područja i rizika prevare, te izvođenjem dokaza.

Govorimo o specifičnom području istraga i procena u području krivičnih i drugih nedopuštenih poslovnih dešavanja i stanja u funkcionisanju društva. Fokus istraživanja poslovne forenzike je na proceni istinitih i poštenih interpretacija ekonomskih kategorija i dokumentacije, poslovnih knjiga i računovodstvenih izveštaja za poslovne, pravne i druge potrebe.

Forenzičko računovodstvo, jedna od najstarijih profesija koja datira još iz vremena Egipćana. „Oči i uši“ faraona bile su oličene u licima koja su u osnovi imala ulogu računovođe – forenzičara i koja su brinula o zalihama pšenice, zlata i druge imovine. To su morale biti osobe od poverenja, odgovorne i sposobne da obavljaju tako uticajnu funkciju.

Od brojnih definicija koje se nalaze u literaturi koja se bavi forenzičkim računovodstvom najpotpunijom se čini ona koju je dalo Američko Udruženje ovlašćenih istraživača prevara (ACFE). Oni definišu forenzičko računovodstvo na sledeći način: „Forenzičko računovodstvo podrazumeva primenu specijalizovanog znanja i veština u vođenju istrage koja podrazumeva prikupljanje, analizu i procenu dokaza, kao i tumačenje i saopštenje nalaza na sudu, i/ili drugom pravnom ili administrativnom mestu. Jednostavnije rečeno, termin forenzika znači biti pogodan za upotrebu na sudu.“ Drugi autori tvrde da forenzičko računovodstvo uključuje primenu finansijske i istraživačke veštine i računovodstva i revizije, za rešavanje nerešenih pitanja u cilju izvođenja dokaza. Može se reći da forenzičko računovodstvo pruža računovodstvenu analizu koja je pogodna sudu i koja će biti osnova za raspravu, a na kraju i za rešavanje sporova“.

U suštini, forenzičko računovodstvo se može definisati kao primena istražnih i analitičkih veština s ciljem da se otkriju prevare i manipulacije u poslovanju preduzeća, odnosno poslovnih organizacija koje odstupaju od računovodstvenih standarda, poreskih propisa i ostalih zakonskih odredbi.

Glavni razlozi koji su doprineli nastanku forenzičkog računovodstva jesu zaštita postojeće imovine i otkrivanje načina počinjenih kriminalnih radnji. Evidentno je da forenzičko računovodstvo, kao posebna disciplina, nastalo kao neophodna reakcija na različite vidove prevara koji su se javljali kroz istoriju. Njen razvoj doprineo je rešavanju različitih kompleksnih slučajeva kriminalnih radnji, ali i razvoju ekonomsko-finansijske forenzike kao razgranate oblasti koja uključuje ekspertizu u oblastima procene kapitala, imovine, procene nastale štete, obračuna zarada, kamata, ocene finansijskog upravljanja, oblasti trgovine, bankarstva, računovodstva, analize finansijskih izveštaja, poslova osiguranja, informatike, ali i statističkih analiza i dr. Stoga se forenzički istražitelji odnosno forenzičke računovođe sve više angažuju u cilju otkrivanja i sprečavanja kriminalnih radnji u finansijskim izveštajima.

Forenzičkim računovodstvom bavi se forenzički računovođa. On na profesionalan način ocenjuje stvarnu (zakonitu) i poštenu (moralnu) obradu ekonomskih kategorija, njihovo prikazivanje i izveštavanje za sudske, poslovne, poreske i druge potrebe.

Forenzički računovođa kao nosilac zadataka forenzičkoga računovodstva je stručnjak sa odličnim poslovno-ekonomskim i ekonomsko-pravnim znanjima, te ima sve potrebne karakteristike: obrazovanost, uglađenost, promišljenost, htenje, izvornost, pouzdanost, kooperativnost, pravednost, istinoljubivost, poštenje, samosvest i druge vrline. Forenzički računovođa je glavni i odgovorni nosilac preventivnih i kurativnih radnji, koje se vrše u svrhu smanjenja rizika povezanih s privredno-kriminalnim radnjama. Nosilac forenzičkog računovodstva:

- o proverava i ocenjuje (ne)prikladnost savladavanja poslovnih rizika, sprečava, otkriva ili dokazuje prevare;
- o uz podršku odgovarajućih (verodostojnih) dokaza daje nezavisno i nepristrasno mišljenje o (ne)upitnosti savladavanja poslovnih rizika, kao i o uzročnicima nastalih prevara.

Neophodno je da forenzički računovođa u svom radu poseduje dovoljno široko poslovno-organizacijsko znanje i iskustvo, da bude stručno i moralno pouzdan, tako da je njegovo profesionalno mišljenje (sud) o poslovanju i s njim povezanim prevarama, ili drugim nedozvoljenim radnjama, dovoljno uverljivo. Podrazumeva se da forenzičari raspolazu sa znanjem i veštinama iz oblasti računovodstva, revizije, finansija, pravne regulative, kriminalistike i drugih srodnih disciplina, podržanim savremenim teoretskim otkrićima i najboljom praksom, te sa opšteprihvaćenim profesionalno-etičkim normama. Dakle, forenzički računovođa je stručno lice osposobljeno da otkrije i oceni visinu izgubljene ekonomske koristi, štete i obaveze, koje prouzrokuju prevare.

3.2 Delokrug rada i vrste forenzičkog računovodstva

I pored obavljanja širokog spektra poslova, forenzičko računovodstvo može se podeliti na dva osnovna područja:

1. Istražno računovodstvo, koje ima za cilj otkrivanje prevare kada postoji sumnja da je učinjena kriminalna radnja u finansijskim izveštajima, ili kada se poslovanje klijenta preventivno proverava. Istražno računovodstvo podrazumeva sveobuhvatno istraživanje kriminalnih radnji. Podrazumeva integraciju znanja iz računovodstva, revizije i istražnih tehnika. Usluge istražnog računovodstva pružaju se uglavnom u okolnostima kada se sumnja ili naslućuje mogućnost pojave kriminalnih radnji u finansijskim izveštajima, ili kada se žele proveriti preventivnog karaktera u poslovanju klijenta. Kod ove vrste angažovanja, saznanja i eventualni dokazi o nezakonitostima tek trebaju da se prikupe i dostave klijentu i, ako to zakoni nalažu, pravosudnim organima, a zarad otpočinjanja sudskog postupka. može se javiti u dva oblika:

- a) Finansijsko-kriminalistička ispitivanja – ovo je posebna disciplina u okviru forenzičkog računovodstva koja istražuje prevare u finansijskim izveštajima. Ova vrsta ispitivanja podrazumeva proaktivni pristup metodologiji usmeren na uočavanje i prepoznavanje prevara u finansijskim izveštajima. Istražitelji koji su angažovani u okviru ove delatnosti obično potiču iz državnih kontrolnih i istražnih agencija, revizorskih kuća i kriminalističkih službi i svi zajedno predstavljaju tim sa različitim znanjima, veštinama i iskustvima koje koriste u otkrivanju i dokumentovanju kriminalnih radnji. Forenzički računovođa kao lice zaduženo za sprovođenje finansijsko-kriminalističkih istraživanja najviše odgovara postojećoj ulozi lica koja u okviru nadležnih policijskih službi/agencija rade na poslovima kriminalističkih i drugih istraga, pre svega u oblasti finansijskog kriminaliteta.
- b) Forenzička revizija – nezavisna forenzička revizija finansijskih izveštaja je nova specijalizovana usluga u okviru procesa revizije finansijskih izveštaja. Forenzička revizija podrazumeva ugovaranje posebnog angažovanja sa revizorskim kućama i zahteva rad revizora sa posebnom obukom i iskustvom u sprečavanju i otkrivanju prevara. Forenzički računovođa kao lice koje se bavi forenzičkom revizijom najviše odgovara pojmu klasičnog finansijskog revizora, odnosno lica koje sprovodi aktivnosti na reviziji finansijskih izveštaja i reviziji usklađenosti, premda njihove aktivnosti nisu identične.

2) Sudska podrška, koja ima za cilj pružanje profesionalnih usluga kada su određene radnje već identifikovane i ušle u sudski proces. Odnosi se na pružanje profesionalnih usluga licima koja su uključena u sudske postupke. Profesionalne usluge vrše lica koja poseduju računovodstvene i revizorske veštine i druga znanja koja doprinose rešavanju sporova, poput finansijskog veštačenja, konsultantskih i drugih usluga. Američki institut ovlašćenih javnih računovođa (AICPA) definiše usluge sudske podrške kao bilo koju profesionalnu podršku koja se pruža advokatima u sudskim procesima od strane osoba koje po profesiji nisu advokati. U suštini sudska podrška forenzičkog računovodstva se može definisati kao bilo koji oblik profesionalnih usluga koje se pružaju advokatima i stranama u tekućim ili očekivanim sudskim postupcima od osoba koji nisu advokati, ali poseduje znanje računovodstva i revizije i koje mogu pomoći u rešavanju sudskih sporova. Za razliku od istražnog računovodstva, sudska podrška kao područje forenzičkog računovodstva, nije ograničena u sudskim postupcima samo na kriminalne radnje, tj. na krivične postupke. Usluge sudske podrške mogu se klasifikovati u tri oblasti i to, konsultantske usluge, usluge finansijskog veštačenja i ostale usluge. Forenzički računovođa kao lice koje pruža usluge sudske podrške trenutno se najviše može prepoznati u liku sudskog veštaka ekonomske ili neke druge struke.

- a) Konsultantske usluge – putem ovih usluga forenzičke računovođe pružaju savete u vezi sa računovodstveno-finansijskim pitanjima koja su važna za sudski postupak. Forenzičke računovođe se u okviru ove usluge ne pojavljuju na sudu već savetuju sve strane u sudskom sporu u vezi određenih problema;

- b) Usluge finansijskog veštačenja – forenzičke računovođe se mogu, na osnovu njihovih ekspertiza, znanja i iskustva, angažovati na sudu u ulozi sudskog veštaka. Kao angažovani sudski veštak forenzički računovođa može dostaviti svoj izveštaj i mišljenje u vezi određenih sudskih predmeta;
- c) Ostale usluge – u okviru ovih usluga forenzičke računovođe se mogu u okviru sudskih procesa javiti u ulozi medijatora jedne od strana u sudskom postupku, od suda imenovan ekspert za svedočenje i slično.

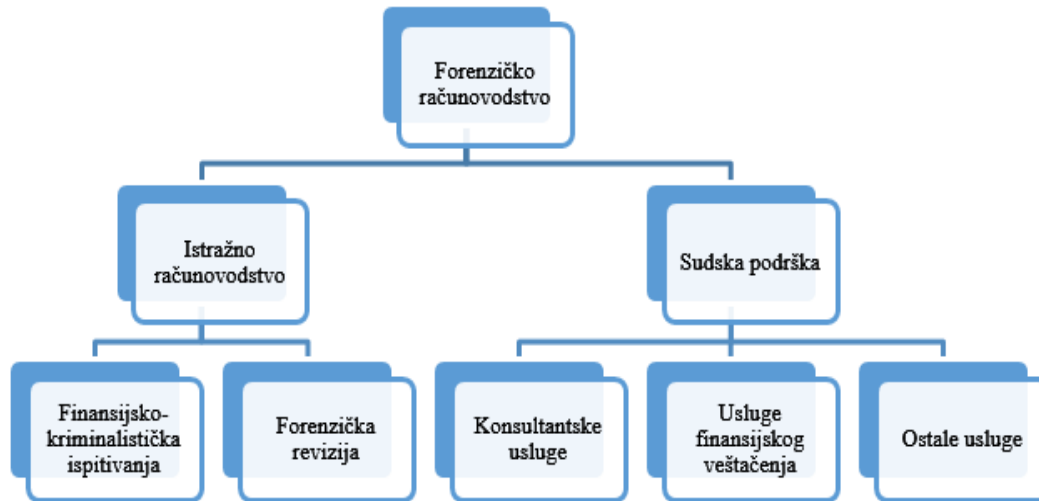


Figure 1. Delokrug forenzičkog računovodstva

Iz prethodnog proizilazi da forenzičko računovodstvo podrazumeva obavljanje široke lepeze usluga i poslova, koje pored već navedenih, podrazumeva i pružanje usluge u vezi različitih situacija uključujući i vrednovanje imovine u odštetnim zahtevima, vršenje procene poslovnih partnera i sl. Značaj forenzičkog računovodstva u funkcionisanju privrede je u tome što sprečava i otkriva kriminalne radnje koje unose nesigurnost u procesu poslovanja što odvrća poštene preduzetnike od daljih poslovnih aktivnosti. Osim toga, pojedini oblici kriminalnih radnji, poput poreske utaje, ugrožavaju javne prihode, narušavajući time funkcionisanje države.

3.3 Ciljevi, zadaci i mogući modeli organizovanja forenzičkog računovodstva

Izbor ciljeva forenzičke analize zavisi od njene svrhe, koju određuje naručilac. Odluku o angažovanju forenzičkih računovođa može doneti sudski organ, uprava banke, privredno društvo, vlasnik kapitala, kreditori, investitori i dr., ukoliko im je potrebna objektivna, nezavisna i stručna procena u pogledu postojanja prevara u organizaciji. Za neku svrhu, npr. ocena potencijalnog partnera, dovoljna je procena forenzičara o mogućim, velikim nepravilnostima i visokom stepenu rizika od prevare. Kada postoji sumnja da postoje prevarne radnje, cilj je odrediti da li se ona već desila ili se dešava, i odrediti ko je njen izvršilac. Dakle, za pokretanje krivične odgovornosti nužan je valjan dokaz o nepravilnostima ili prevari. Kod podrške u sporovima, klijent je taj koji određuje cilj.

Forenzička analiza ima sledeće osnovne ciljeve: otkrivanje područja mogućih nepravilnosti ili prevara, odnosno sužavanje područja traganja za određenim nepravilnostima, odnosno lociranje područja nepravilnosti ili prevare; otkrivanje konkretnih nepravilnosti ili prevara odnosno načina izvršenja; ocena visine rizika od utvrđenih nepravilnosti ili prevara, odnosno ocena opasnosti učinjene nepravilnosti ili prevare (namerno, nenamerno, visok ili nizak nivo nepravilnosti, velika ili mala opasnost od izvedene prevare i slično); izvođenje dokaza odnosno obezbeđenje materijalnih i drugih dokaza da je nepravilnost ili prevara učinjena i načini izvršenja.

Zadaci forenzičkih računovođa su da analiziraju, interpretiraju, sumiraju i prezentuju međusobno povezane poslovno-finansijske pozicije, tako da budu razumljive i na odgovarajući način potkrepljene. Forenzičke računovođe učestvuju u sledećim aktivnostima:

- istraživanju i analiziranju dokaza o učinjenoj prevari;
- razvijanju kompjuterizovanih aplikacija koje će poslužiti u analizama i prezentacijama o finansijskim dokazima;
- prezentacijama rezultata istraživanja u vidu izveštaja i kompletiranja dokumentacije;
- asistiranju u pravnim postupcima, uključujući svedočenja na sudu u ulozi svedoka-stručnjaka, te pripremanju vizuelnih sredstava koja će služiti kao dokaz na suđenju.

Tokom istraga, forenzičke računovođe se ne ograničavaju samo na interno područje (zaposleni i menadžeri), već uzimaju u obzir i eksterno područje, odnosno mogućnosti kriminalne radnje od strane poslovnih partnera (kupaca, dobavljača, banaka i/ili ostalih partnera). Kao i svaki seriozan posao, tako i istraga koju sprovode forenzičke računovođe zahteva određenu vrstu pripreme. Naime,

pre nego što započnu sa sprovođenjem istrage, forenzički istražitelji moraju savladati pravila finansijskog računovodstva; proučiti detaljno Međunarodne standarde finansijskog izveštavanja; savladati veštine analize finansijskih izveštaja; proučiti računovodstvene tehnike koje se najčešće pojavljuju pri formiranju lažnih finansijskih izveštaja; savladati pravila, tehnike i veštine analize kriminalnih radnji.

Forenzičke računovođe mogu da deluju: preventivno, radi odvratanja od prevare ili nakon sumnje u mogućnost prevare koja još nije nastala, i kurativno (naknadno), nakon sumnje da je prevara učinjena ili nakon otkrivanja prevare. Smisao preventivnog rada je u tome da se njime sprečava nastanak nedozvoljenih privrednih radnji. One nisu prisutne, a nema ni vidljivih znakova da bi se mogle dogoditi. Pomaže pri uspostavljanju odgovarajućeg kontrolnog sistema za ovladavanje takve vrste poslovnog rizika. Pri kurativnom radu, forenzičar se sreće s pojavama koje ukazuju na kriminalne radnje. Od forenzičara se očekuje da preispita i oceni takve nedozvoljene radnje i da o njima prezentuje samostalno i nepristrasno mišljenje, potkrepljeno sa dovoljno pouzdanih dokaza. Smatra se da potencijalne počinioc privredno-kriminalnih radnji, već samo saznanje o novim oblicima borbe protiv njih (kao što je na primer forenzičko računovodstvo) može uveliko odvratiti od nemoralnih i nedozvoljenih namera.

Inače, kad preduzme forenzičku istragu u nekoj organizaciji, forenzičar može delovati na: internom polju unutar organizacije (predmet istrage su moguće prevare zaposlenih i menadžera) i na eksternom polju, odnosno izvan te organizacije (predmet istrage su moguće prevare od strane poslovnih partnera: kupaca, dobavljača, banaka i ostalih partnera).

Mogući modeli organizovanja forenzičkog računovodstva:

- model angažovanja forenzičkih računovođa u okviru aktivnosti istražnih organa,
- model angažovanja u okviru posebne, nezavisne strukovne organizacije forenzičkih računovođa,
- model koji podrazumeva kombinaciju prethodna dva,
- angažovanje forenzičkih računovođa od strane nezavisne eksterne revizije,
- uspostavljanje forenzičkog računovodstva u okviru državnih revizorskih institucija,
- uključivanje forenzičkog računovođe u tim revizora prilikom redovne godišnje revizije finansijskih izveštaja;
- uvođenje obavezne forenzičke revizije za sve subjekte od javnog interesa;
- uvođenje iznenadne/vanredne forenzičke revizije prema načelu slučajnog izbora za sve subjekte od javnog interesa;
- sprovođenje reaktivne ili proaktivne forenzičke revizije na zahtev akcionara;
- sprovođenje forenzičke revizije na osnovu dojave ili sumnje u postojanje prevare.

3.4 Analitičke procedure i tehnike forenzičkog istraživanja

Od forenzičkog računovođe se očekuje da istražuje mnogo različitih vrsta kriminalnih radnji. Za otkrivanje i dokazivanje kriminalnih radnji, potrebno je specifično znanje i iskustvo, odnosno potrebni su specijalisti koji do detalja poznaju tehnologiju i način poslovanja u pojedinim oblastima, kao i propise koji regulišu istu, a zatim i pojavne oblike prevarnih radnji kao i metodiku njihovog dokazivanja. Razvojem forenzičkog računovodstva unapređena su specijalizovana znanja i veštine, neophodna za efikasniju borbu protiv kriminalnih radnji. Ono podrazumeva primenu svih računovodstvenih, revizorskih i drugih finansijskih veština i znanja u razjašnjavanju odnosa, činjenica i ekonomskih transakcija koje mogu biti, ili su već predmet sudskog postupka i slično.

Forenzičke računovođe kombinuju svoja računovodstvena znanja sa revizorskim, istražnim tehnikama, kao i drugim veštinama, a sve u cilju detekcije kriminalnih radnji. Tokom istrage mogućih nezakonitih radnji, forenzičke računovođe koriste razne tehnike za analizu odnosa između elemenata finansijskih izveštaja. Ove analize se koriste za kasniju detaljniju analizu poslovnih transakcija ukoliko početna analiza elemenata finansijskih izveštaja ukaže na mogućnost postojanja prevare. Analitičke procedure u forenzičkom računovodstvu, po pravilu se primenjuju fazno, gradirane od najopštijih do krajnje direktnih. Svaki od tih segmenata analize ima svoje specifične ciljeve, kao što su:

- Preliminarne (pripremne) analitičke procedure, kao najopštije, koriste se za identifikovanje područja visokog rizika od prevare, sticanje uvida u prirodu i vreme nastajanja manipulacija, kao i procenu stepena neophodnosti primene odgovarajućih forenzičkih procedura za njihovo dokazivanje.
- Nezavisne analitičke procedure se koriste za pribavljanje dokaza, kroz upoređivanja i usklađivanja konkretnih podataka, te utvrđivanje verodostojnosti (ispravnosti) dokumentacije, knjiženje i obračun.
- Konačne analitičke procedure, kao najdirektnije, koje služe za donošenje zaključaka o uticaju problematičnih transakcija na finansijske izveštaje.

Najčešće tehnike koje koriste forenzičke računovođe bazirane su na različitim tehnikama finansijske analize, kao što su:

- Horizontalna analiza – upoređuje stavke iz tekućeg perioda sa istim stavkama iz prethodnog perioda.
- Vertikalna analiza — upoređuje procentne udele pojedinih stavki u finansijskim izveštajima.
- Upoređivanje detaljnih stavki u finansijskim izveštajima sa istim ili sličnim stavkama iz prethodnih perioda.
- Analiza odnosa – u finansijskim izveštajima u područjima profitabilnosti, likvidnosti, solventnosti, aktivnosti i stvaranja vrednosti.

Forenzičko računovodstvo, pored tehnike tradicionalnog računovodstva, intenzivno primenjuje i neke specifične tehnike:

Benfordov zakon – pokazuje kolika je verovatnoća da se neka cifra nađe na pravom mestu u broju. Suština Benfordovog zakona je da se određene cifre javljaju češće od drugih u skupovima podataka.

Beneishov model – koristi se za procenu mogućeg stepena prevara u finansijskim izveštajima na osnovu osam varijabli (indeksa).

Komputerski podržane tehnike revizije (CAATS) – predstavlja praktičnu primenu informacionih tehnologija u poslovima forenzičke revizije.

Tehnike pretraživanja podataka (Data mining techniques) – set tehnika dizajniranih za automatsko pretraživanje velike količine podataka, sa ciljem pronalaska informacija koje će pomoći u otkrivanju prevara.

Racio analiza – ima veliku analitičku ulogu u forenzičkom istraživanju. Svaki od racija predstavlja prilično pouzdan trag u otkrivanju potencijalnih prevarnih radnji.

Navedene metode se, pre svega, dopunjuju razgovorom sa osumnjičenima za potencijalnu kriminalnu radnju kao i detaljnim analizama svih faktora koji utiču na poslovanje subjekta. Pristup istraživanju i odabir forenzičkih tehnika zavise od toga da li se radi o preventivnom istraživanju ili o istraživanju već otkrivene kriminalne radnje. U prvom slučaju, forenzičari sprovode preventivna ispitivanja kako bi otkrili moguće nepravilnosti. Ukoliko se opštom proverom ustanove neuobičajeni trendovi, forenzičar nastavlja testiranje sumnjivih bilansnih pozicija i sprovodi detaljna ispitivanja u cilju prikupljanja relevantnih dokaza koji bi potkrepili ili odbacili sumnju o prevari. S druge strane, istraživanje nezakonitih radnji i postupanja za koje postoji osnovi sumnja da su izvršene, podrazumeva direktniji postupak, odnosno istraga se odmah fokusira na traženje dokaza u tačno određenom području.

Pored prednosti forenzičkog računovodstva u otkrivanju i sprečavanju prevara, ono ima i neke nedostatke. Angažovanje forenzičkih računovođa je skupo, postoji mogućnost curenja poverljivih informacija, do narušenja ugleda preduzeća i gubljenja poverenja zaposlenih. Svako angažovanje forenzičkih računovođa iziskuje određeni trošak za preduzeće koje ga angažuje, jer se u analizi koriste procedure koje traže korišćenje računarskih softvera i rad računovođa. Gubitak informacija koje poseduju, kao i nestručno rukovanje bazom podataka, može da predstavlja udar na realno dobijene izveštaje.

4. Borba protiv korupcije- forenzičko računovodstveni pristup

Korupcija odnosno koruptivna krivična dela (npr. Primanje i davanje mita, zloupotreba službenog položaja...) su najčešće dobro osmišljena i prikrivena jer izvršioci ovih krivičnih dela nastoje da prikriju tragove o njihovim nezakonitim postupcima. Ipak, poznato je da ne postoji savršen zločin, i shodno svaka kriminalna radnja uvek ostavlja neki trag. Pitanje je samo sposobnosti uočavanja pojedinih indicija i tzv. „crvenih zastavica“, koje mogu ali i ne moraju uvek biti znak izvršenja krivičnih dela. U tom smislu „crvene zastavice“ mogu ukazati da na prvi pogled „nešto nije u redu“ i ukazati na prve nagoveštaje o mogućim kriminalnim radnjama.

Forenzičko računovodstveni pristup istraživanja kriminalnih radnji i korupcije predstavlja metodologiju za razotkrivanje istih i uključuje pribavljanje i analizu dokaza, intervjuje lica, pisanje izveštaja i svedočenja. Na osnovu pokazatelja kriminalnih aktivnosti, kao što su manjak gotovine ili drugi dokazi, vrši se istraga kako bi se utvrdio stepen gubitka, tj. materijalna šteta i identitet počinoca. Za otkrivanje i dokazivanje nezakonitih radnji, potrebno je specifično znanje i iskustvo, odnosno potrebni su specijalisti koji do detalja poznaju tehnologiju i način poslovanja u pojedinim oblastima, kao i propise koji ih regulišu, a zatim i pojavne oblike prevarnih radnji kao i metodiku njihovog dokazivanja. Razvojem forenzičkog računovodstva unapređena su specijalizovana znanja i veštine, neophodna za efikasniju borbu protiv prevara.

Uloga forenzičkih računovođa nije da utvrde krivicu pojedinaca već činjenično stanje, odnosno da utvrde i ukažu šta se tačno dogodilo, da ukažu na važne činjenice koje bi kasnije pomogle istražnim organima u postupku protiv onih osoba za koje se sumnja da su izvršile prevare. Osnova početka istrage forenzičkih računovođa je upućivanje pisma namere od strane onih koji angažuju forenzičke računovođe. U pismu namere detaljno se objašnjava šta se traži od njih, iznose detalje koji su poznati o mogućoj prevari i svi dodatni podaci koji bi mogli da pomognu u istrazi.

Postupak obavljanja zadataka forenzičkog računovođe odvija se u sledećim koracima:

1. početak istrage (angažovanje forenzičara, definisanje ciljeva istrage);
2. teorijska analiza kriminalnih radnji;
3. formiranje plana prikupljanja dokaza;
4. prikupljanje dokaza;
5. analiza prikupljenih dokaza;
6. izrada izveštaja o nalazima forenzičkog računovođe.

Prvi korak u procesu istraživanja kriminalne radnje je započinjanje istrage. Kriminalne radnje u organizaciji najčešće počinju dojavom ili slučajnim otkrivanjem kriminalne radnje. Sumnja je neophodna da bi se započela forenzička istraga. Ona je skup okolnosti koje na razborit i razuman način navode profesionalno obučeno lice da veruje da se kriminalna radnja već dogodila, da se događa ili će se tek dogoditi. Međutim, kod podrške u sporovima sumnju iznosi pravni zastupnik.

U situaciji kada kriminalna radnja nije poznata ili postoje ograničene informacije, sledeći korak bi bio teorijski pristup kriminalnoj radnji. Na osnovu ovog pristupa, forenzički računovođa korišćenjem „brainstorminga“ predlaže najverovatniju kriminalnu šemu i moguć način na koji bi takva kriminalna šema mogla biti izvršena u oštećenju organizaciji. Jasno je da forenzički računovođa mora

da poznaje metode kriminalnih radnji i znake upozorenja za svaku od tih kriminalnih šema. Teorijska saznanja zatim služe kao osnova za razradu plana istrage, tj. plana sakupljanja dokaza. Koristeći ovu teoriju, forenzički računovođa razvija plan za prikupljanje dovoljnih i odgovarajućih dokaza. Ovo je korak u kome do naročitog izražaja dolazi revizor kriminalnih radnji. Kod ovog koraka vrši se ispitivanje računovodstvenih evidencija, transakcija, dokumenata i podataka radi pribavljanja dovoljnih dokaza koji treba da potvrde ili ospore izvršenje prethodno identifikovane kriminalne radnje. Vrlo bitno u fazi analize dokumentacije jeste pravilno tumačenje rezultata podataka, radi utvrđivanja činjeničnog stanja.

Nakon prikupljanja računovodstvenih dokaza forenzičke računovođe pokušavaju da kroz razgovore-intervjue prikupe dokaze od očevidaca. Ovaj proces polazi od ljudi koji su najudaljeniji od kriminalne radnje (nisu uključeni u takve radnje, ali mogu posedovati određena znanja), pa do sužavanja kruga ljudi koji su se nalazili u neposrednom okruženju kriminalne radnje (saznanja dobijena iz prve ruke), sve do poslednjeg koraka, a to je obavljanje intervju sa osumnjičenim licima.

Važno je napomenuti da je poslednji korak u procesu istrage pristupanje osumnjičenom. To se može desiti sa namerom ili slučajno. Pristup sa namerom je dovoljno lako izbeći, ali slučajan pristup zahteva dodatne napore. Kada istražitelj naiđe na anomaliju (dokument, računovodstvenu transakciju ili drugi dokaz nečega što ne bi trebalo da je tu ili na znak upozorenja koji asocira na kriminalne radnje ili na kršenje internih kontrola), pre nego što pristupi određenoj osobi s ciljem dobijanja objašnjenja, treba da utvrdi da li je moguć razlog takve anomalije kriminalna radnja ili to nije slučaj. Razlog za ovakvu opreznost je slučaj kada nesvesno imamo dokaz u rukama i kada se obratimo strani koja je odgovorna za kriminalnu radnju i zamolimo tu osobu da da objašnjenja u vazi sa otkrivenom anomalijom. U ovoj tački, istraživanje je u najboljem slučaju znatno otežano, a u najgorem slučaju već iskompromitovano.

Po završenoj istrazi, forenzički računovođa svoje nalaze izlaže u izveštaju, čija forma i sadržina zavise od toga za koje namene je sastavljen. Tako, kao rezultat istrage može biti sastavljen izveštaj za naručioca pod nazivom izveštaj o istrazi ili izveštaj za potrebe sudskog postupka kada se označava kao ekspertski izveštaj. Bez obzira o kom obliku izveštaja je reč, forenzički računovođa mora pri njegovom sastavljanju biti objektivan i profesionalan. Odnosno, bez obzira na to da li će predmet dospeti na sud, rad forenzičkog računovođe se mora na efektivan način predočiti. Svrha izveštaja je da predstavi rezultate istrage i prikaže ih na način koji bi korisnicima izveštaja omogućio donošenje ispravnih odluka. Informacije koje izveštaj sadrži moraju biti tačne, jasne, nepristrasne, relevantne i blagovremene.

Izveštaj mora da sadrži podatke koji će pomoći u istrazi nadležnih državnih organa, da bude održiv na sudu, ali ne sme izričito da optužuje pojedinca ili grupu zaposlenih. Zbog svega navedenog, forenzičke računovođe moraju biti veoma pažljivi prilikom formiranja izveštaja, posebno sa načinom izražavanja u vezi sa istragom. Dakle, nakon obavljanja pomenutih koraka, postoje dve mogućnosti. Jedna je da je izvršilac kriminalne radnje identifikovan i da je prikupljeno dovoljno dokaza koji potkrepljuju osnovanu sumnju u njegovu krivičnu odgovornost. Dok je druga upravo suprotna. Ukoliko izvršilac nije poznat, potrebno je sprovesti dalja istraživanja. Inače, dokazni materijal prikupljen tokom istraživanja može da obuhvata izjave svedoka, prikupljenu dokumentaciju, sredstva izvršenja kriminalnog akta, sredstva kao plod izvršene kriminalne radnje i po mogućstvu priznanje izvršioca. Iskusni istražitelji znaju koji dokazi su bitni i potrebni za dokazivanje određenih krivičnih dela, kao i načine pribavljanja takvih dokaza. Intervju sa osumnjičenim, odnosno uzimanje izjave, obavlja se tek nakon što se identifikuju, prikupe, procene i obrazlože svi relevantni podaci.

Nakon obavljanja pomenutih koraka, postoje dve mogućnosti. Jedna je da je izvršilac kriminalne radnje identifikovan i da je prikupljeno dovoljno dokaza koji potkrepljuju određeni stepen sumnje u njegovu krivičnu odgovornost. Dok je druga upravo suprotna. Ukoliko izvršilac nije poznat, potrebno je sprovesti dalja istraživanja. Dokazni materijal prikupljen tokom istraživanja može da obuhvata izjave svedoka, prikupljenu dokumentaciju, sredstva izvršenja, sredstva koja predstavljaju imovinsku korist i po mogućstvu priznanje izvršioca. Iskusni istražitelji znaju koji dokazi su bitni i potrebni za dokazivanje određenih krivičnih dela i načina pribavljanja takvih dokaza. Intervju sa osumnjičenim, odnosno uzimanje izjave, obavlja se tek pošto se identifikuju, prikupe, procene i obrazlože svi relevantni podaci.

Zaključak

Korupcija negativno deluje na razvoj država i dešava se u svim društvima. To je pojava koja urušava poverenje javnosti u državne organe i onemogućava razvoj države. Borba protiv korupcije je vrlo teška jer ostavlja male ili nikakve tragove. Često između nastanka koruptivnog dela i otkrivanja prođe veliki vremenski period. Zbog ovog velikog vremenskog perioda, postoji velika mogućnost da korupcija i kad se otkrije često ne može da se procesuiru i učinioci ostanu nekažnjeni.

Forenzičko računovodstvo predstavlja profesiju o čijem se sistemskom uspostavljanju u domaćim okolnostima uglavnom sporadično razmišlja, iako je neke konture te profesije moguće i sada prepoznati u aktivnostima lica zaduženih za javni nadzor i kontrolu ili za provođenje istražnih radnji u cilju otkrivanja i dokazivanja koruptivnih i drugih kriminalnih dela u sistemu.

Do sistemskog uspostavljanja funkcije forenzičkog računovodstva teško može doći ukoliko se prethodno ne pokrene snažna javna debata o značaju te funkcije i njenom mogućem doprinosu u otkrivanju i dokumentovanju različitih kriminalnih radnji i štete do koje dolazi zbog njihovog nastanka. Stručnu debatu je neophodno otvoriti u zakonodavnim i drugim institucijama sistema, kao i na odgovarajućim visokoškolskim ustanovama, te u okviru postojećih profesionalnih udruženja koja okupljanju stručnjake iz srodnih profesija. Benefit od uspostavljanja forenzičkog računovodstva mogao bi daleko da nadmaši troškove njegovog uvođenja u sistem.

Aktivno delovanje forenzičkih računovođa u sistemu prevencije i borbe protiv korupcije u javnom sektoru ničim ne bi umanjilo ulogu i značaj već postojećih mehanizama javnog nadzora i kontrole (eksternih i internih revizora, budžetske inspekcije i dr.) Naprotiv, uticalo bi na bolje razumevanje stvarne uloge tih mehanizama u sistemu i na povećanje upotrebne vrednosti rezultata ostvarenih kroz njihovo funkcionisanje.

Potrebno raditi na razvoju ove relativno mlade discipline – forenzičkog računovodstva, kao i na edukaciji novih kadrova, tzv. „forenzičkih računovođa“, koji će raspolagati zavidnim znanjima iz različitih oblasti, te biti spremni ista implementirati na otkrivanju i prikupljanju dokaza u najsloženijim predmetima korupcije i drugih težih oblika kriminala.

Korupcija je jedan od najozbiljnijih problema kod nas, odmah iza siromaštva, nezaposlenosti, političke nestabilnosti i kriminala. Postavljaju se pitanja: Da li forenzičko računovodstvo može biti odgovor na korupciju kao društveno negativne pojave u društvu ? i Da li se njegovom primenom te pojave u društvu smanjuju? Odgovor je „ne“, jer uloga forenzičkog računovodstva nije da ispravlja društvene anomalije, već da istražuje, u ovom slučaju korupciju, u cilju otkrivanja počinioca u konkretnim organizacijama (bilo državnim preduzećima, službama ili privatnim kompanijama). To nikako ne znači da ne postoji i društvena uloga forenzičkog računovodstva. Forenzički rad donosi konkretan rezultat, a to sprečava nove počinioce. U tome je njegova šira društvena uloga, ali sistemski borba protiv korupcije jeste i mora biti na najvišem nivou.

Da bi se na efikasan način borilo protiv korupcije, potrebno je razviti snažne kontrolne mehanizme koji će integrisati interne i eksterne kontrole o time povećati efikasnost ovog procesa. Dokazi forenzičke analize se prikupljaju na način da budu prihvatljivi za sud koji procesuirá počinioce (ili interne komisije u organizacijama koje procenjuju kršenja pravilnika te organizacije ukoliko su u pitanju manji prekršaji). Kako će sud, komisije ili vlasnik (odnosno naručilac) reagovati nije u domenu forenzičkog računovodstva.

Problemi u vezi sa koruptivnim aktivnostima s kojima se suočavaju organizacije i koji su potencijalna pretnja nadilaze dosadašnja znanja i postaju sve sofisticiraniji. Zbog toga forenzičari i njihova specijalistička znanja postaju karika koja upotpunjuje i čini još efikasnijom borbu protiv korupcije i prevara uopšte.

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Public key infrastructure and methods of e-mail protection

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Abstract

Today, a higher level of safety in communications over electronic networks is needed. Public Key Infrastructure (PKI) represents a way to enable a high level of safety in the means of pairing keys between users. It represents the basis on which other applications, systems and components of network security are built. PKI represents a broad approach that is constantly evolving to meet the growing needs of the business world. As e-mail represents the most common form of communication in the business world, the use of a PKI system will increase the level of safety of e-mail communication between users. This paper describes the basic concepts related to PKI systems methods of implementation of these systems, certificates, design and implementation of PKI systems in electronic mail.

Keywords: PKI, e-mail, security, protection, cryptography

Introduction

At the beginning of the 70s of the last century, the development of the PKI system took place in the British intelligence agency GCHK, where James Ellis, Clifford Cox made important discoveries regarding encryption algorithms and key distribution. Since the developments at GCHK are highly confidential, the results of this work were kept secret and not publicly acknowledged until the mid-1990s.

With the further development of high-speed digital electronic communications (the Internet and its predecessors), the need for ways in which users could communicate securely with each other became evident, and as a further consequence of that, also for ways in which users could be sure with whom they were communicating. actually interacted.

Combination of encryption and authentication enables reliable online commerce, communication and web browsing. Without PKI we would not have complex identities on the Internet and many onlajn the services to which we have become accustomed would not be available. Also, the security of end-clients when sending e-mails would be compromised, and therefore the increasing use of PK is recommended.

Concept of infrastructure of public keys

Public Key Infrastructure (PKI) is a complex system consisting of cryptographic technologies, protocols, standards, policies, procedures, services and applications. The basic concept on which the PKI system is based is asymmetric cryptography or cryptography of public cryptographic keys (Milojković, 2007). PKI represents a modern security architecture for protecting and securely distributing information in a distributed environment. PKI storage and revocation of electronic certificates and management of the public key infrastructure. PKI enables the making connections of links between public keys and entities (in the form of certificates), verifies links between entities and enables services necessary for key management in distributed system.

The purpose of PKI is to facilitate the secure electronic transfer of information for a range of online activities such as e-commerce, online banking and trustful e-mail. It is required for activities where simple passwords are an inadequate method of authentication and more rigorous proof is required to confirm the identity of the parties involved in the communication and to validate the information being transmitted (Chien, Hung-Yu, 2021).

Public Key Infrastructure (PKI) is a system for creating, storing and distributing digital certificates that is used to verify that a public key belongs to a specific entity. PKI creates digital certificates that map public keys to entities, securely stores these certificates in a central repository, and recall them if necessary (Frühlinger, 2020).

Essentially, Public Key Infrastructure is a comprehensive term for everything used to establish and manage public key encryption, one of the most common forms of Internet encryption. It is built into every browser in use today to ensure safe internet browsing :

(Confidentiality) - it is guaranteed that the content of the message can be found out only by the user to whom the message is intended; authentication - the identity of users communicating over the network is verified; integrity - it is guaranteed that the message has not been changed during transmission; non-repudiation - it is impossible to deny the completed transaction.

PKI is a comprehensive system that provides public key encryption and the use of digital. PKI manages keys and certificates. Using PKI, an organization can create and manage a trusted and reliable network environment (Entrust, 2017). PKI is usually synonymous with asymmetric encryption because it is more secure than symmetric encryption.

Advantages and disadvantages of PKI

There are many advantages and disadvantages associated with PKI. Between the main disadvantages is that some seller sell different versions of PKI, however, if the vendor goes bankrupt it is difficult to get the service in the future (Oppliger, 2014). Also, fraudulently issued certificates replace the kernel software with malware that mimics code signing certificates. As another shortcoming, a violation of the company that issued the CA is issued. Companies consider their information private.

Companies consider that their information is private. Companies that cannot afford the costs or do not want to delegate authority to a third-party public CA, would have to invest in their own solutions. A major concern of companies that transmit digital information is security. Company transactions can be confidential and need to be protected from corrupt hands, so the best solution for such companies is PKI. Costs should be cited as a major advantage of PKI systems. Namely, PKI can reduce the costs of labor-intensive transactions. The high speed and increased volume of transactions can reduce the cost per transaction, which would lead to an increase in market share. PKI is one of the best methods of creating an infrastructure that is secure for internet transactions and from hackers, information stealing and virus injection. PKI is not required in a single-user environment and also does not replace symmetric encryption but rather augments it to make it more secure (Lozupone, 2018).

Functional requirements of the PKI system

The PKI system should implement certain requirements for the better functioning of the system. In order to adapt the system to changes in different work policies, the PKI system must provide support to end users for the application of different security policies. Also, it must fulfill certain requirements regarding the security of the system, which refers to the establishment of a single point of trust in the system of the Certification Authority (CA). PKI systems are designed so that they can be implemented in small systems with one computer as well as large ones with the implementation of multiple hierarchical CA systems under the authority of one main "Root CA" system.

In order to solve the different PKI requirements, the system should be flexible, in order to facilitate their solution. These characteristics include (Korać, 2010):

- Multiple systems for registration and delivery of certificates and keys
- Support various security modules, small hardware modules (tokens) and smart cards
- Support for the application of various cryptographic algorithms
- Multiple systems of publication of issued and withdrawn certificates that include various external directory services
- Support with different methods of checking the validity (revocation) of digital certificates
- Support for complex PKI hierarchies
- Support for multiple keys and certificates per user
- The system should support a flexible authorization process

As the PKI system includes several subjects (Security Administrator, CA Administrator, RA Operator as well as the end user), it should be made so that it is easy to apply to all users. In addition, the system must be based on open standards such as the X.509 standard.

Components of the PKI System

The basic components of the PKI System are (Latinović et al, 2010):

- certification policy (Certificate Policy - CP),
- practical work rules (Certificate Practice Statement - CPS),
- certification body (Certificate Authority - CA),
- Registration Authority (RA),
- certificate distribution systems (Certificate Distribution Systems - CDS)
- PKI applications.

The Certification Policy (CP) establishes the basic principles of the work of the Certification Body. The policy contains certain principles that organizations must apply. The policy clearly defines who, what and how can work with systems and data.

The practical rules of work (CPS) are a document that regulates the work of the Certification Body. The CPS document enumerates the procedural and operational practices of the PKI. CPS describes in detail all the processes in the life-cycle of a public key certificate including its generation, issuance, managing, storage, deployment and recall. CPS also needs to indicate the original entity of the authentication process by which the lower entity must be confirmed before it is placed in the PKI.

The Certification Body (CA) is the most important component of the PKI System. The certification body is a software-hardware application that, as an input parameter, takes the public key of an asymmetric cryptography system, places it in the framework of a digital certificate and digitally signs all this, together with other data, in order to guarantee that the given public key belongs to the defined user (the owner of the given digital certificate) (Korać, 2010).

Registration Authority (RA) is an optional but common component of a PKI. An RA is used to perform some of the administrative tasks that a CA would normally perform. RA is delegated, with the express permission of CA. The primary purpose of an RA is to verify the identity of the end entity and determine whether the end entity is eligible to issue a public key certificate (Weise, 2001).

Using the PKI system

SSL represents the most widespread use of PKI, but it is certainly not the only one. "Experts Exchange" has a list of actual users of PKI which is:

- Providing a recovery key for an encrypted hard drive
- Ensuring internal communication with database servers
- Signing documents
- Providing local area networks
- Secure messaging — The signaling protocol uses PKI, for example
- Email encryption
- Providing access to Internet of Things devices
- User authentication with applications (eg smart card login, client authentication using SSL/TLS).
- Mobile e-signatures that are created using a mobile device and lean on signature or certification services in a location-independent telecommunications environment

Email protection

PKI represents a good way to secure e-mail because data process over the Internet can be easily intercepted and corrupted if it is not encrypted and this is where the problem of confirming the identity of the sender comes in. Establishing almost universal PKI for web traffic was relatively easy because most of the necessary infrastructure is built into web browsers and servers. Email is accessed through more heterogeneous clients, which makes things a bit more complex.

When we talk about email security there are two important things, which are digital ID and digital signature. A digital ID is a key pair used to sign/verify, encrypt and decrypt a message. One of these keys is available to everyone and public, and the other key is private and not accessible to outside sources.

E-mail encryption

It is used to provide trust and control access to e-mail messages. Assuming that one user wants to send an encrypted message to another user, he needs to select the encryption icon in the e-mail client. While sending an mail, a client requests a public encrypted key from another client, so each client uses the public key of the person they are sending to. A received message can only be opened and decrypt-ed by the user to whom the message is addressed, because only he holds the private key to unlock the message on his computer. In order for an encrypted message to be sent, both clients must have their private and public keys, if the client to whom the message is sent does not have its public encrypted key, a warning message will appear and such a message cannot be sent encrypted, but as a normal one.

Signing mail

It is used to ensure authentication, integrity and non-repudiation. When a user wants to sign mail for another user, he must first hash it, and then encrypt the hash itself with a private key. Users can easily access these options by clicking on the signature sign. A hash algorithm reduces variable length input to a fixed (128 or 160 bit) also called digest or footprint, which has the following characteristics (Rahal, 2003):

- cannot distinguish input from output
- cannot generate the given output
- cannot find two inputs that produce the same output

Hash algorithms are used for:

- Produce fixed-length fingerprint of arbitrary-length data
- Produce data checksums to enable detection of modifications
- Distill passwords down to fixed-length encryption keys

S/MIME

S/MIME is an upgrade to the MIME (Multi-Purpose Internet Mail Extensions) protocol. MIME is an upgrade to the original Internet Mail Protocol (SMTP) that allows the exchange of different types of files on the Internet. The S/MIME protocol is widely used by corporations to increase email security by providing encryption that protects email content from unwanted access. It also adds digital signatures, which confirm that the sender is authentic, which protects against many email attacks. Thus, S/MIME is a commonly used protocol for sending encrypted AND digitally signed e-mail messages and is implemented using S/MIME certificates.

S/MIME can be used to:

- check that the third party did not change the e-mail that was sent
- creating digital signatures to be used when signing e-mails
- encryption of all e-mails
- checking the client's e-mail

Rahal (2003) the main advantages of S/MIME:

- can be used by traditional email clients to add/interpret cryptography security to mail that is sent or received
- is not limited to mail but can be used with any transport mechanism that carries MIME data
- can be used for automated message transmission when using cryptography security services that do not require any human intervention
- supports the latest versions of web browsers

Some of the e-mail clients that use S/MIME encryption are:

- Microsoft Outlook
- Gmail
- Mozilla Thunderbird
- Edison mail
- eM client
- Mail app in iOS
- Windows Mail

Conclusion

PKI is a complex system that is in constant development and in the future it is expected to increase its use in information systems in order to improve security due to the rapid growth of identity theft and data mining. PKI provides a number of benefits in the area of security services. Although there are numerous shortcomings of the PKI infrastructure, it still ensures sufficient security of information systems. With the development of technology, new ways to improve protection mechanisms are expected because the existing ones are becoming easier to penetrate with the advent of new techniques.

PKI represents an excellent way to secure e-mail because data flowing over the open Internet can be easily intercepted and read and changed if it is not encrypted, making it difficult to determine the authenticity of the sender.

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Designing a System for Electronic Management of Business Processes in a Network Environment Using Modern Quantitative Methods

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Abstract

The business environment, in which today's companies operate, implies a union of sociological, technological, economic, and political environments. In addition to influencing the organization, strategy, processes, and performance of companies, the business environment also imposes many often conflicting requirements and challenges. The most important requirements, naturally, are the necessity of accepting modern technologies, increasing competitiveness, and quick response to market demands. The globalization of the world market has inevitably caused its complexity, and therefore all companies today operate in heterogeneous economic, sociological and technological environments. The complexity of the issue certainly implies the application of information systems with the use of modern quantitative methods, which requires strategic and operational harmonization of business functions and IT technologies within the company.

Business process management represents a holistic approach of owners, management and employees, which promotes the effectiveness of business processes and their continuous innovation through the use of flexible and integrative technology, with the aim of effectively adapting the company's organization to market demands and consumer needs. Coordination of activities in the business and IT domains is a prerequisite for the successful implementation of a business process management system.

Keywords: business processes, modern technologies, business environment, quantitative methods

INTRODUCTION

Business environment, in which today's companies operate, implies a union of sociological, technological, economic and political environment. The business environment, in addition to influencing the organization, strategy, processes and performance of companies, imposes a large number of often conflicting demands and challenges. The most important requirements, certainly, are the necessity of accepting modern technologies, increasing competitiveness with lower product prices and quick response to market demands. The challenges of the modern business environment can best be expressed using two terms: heterogeneity and change. The globalization of the world market necessarily caused its complexity, so that all companies today operate in heterogeneous economic, sociological and technological environments. Heterogeneity, in particular, comes to the fore in cooperative and partnership relations with other companies, which may operate in a different business environment. Changes represent the most recognizable characteristic of the modern market. The desire of companies to gain an advantage over the competition, as well as the increased needs and demands of customers, impose a constant need to adapt the company to market conditions. In order to survive in today's global market, companies have to adapt their organization and products, both to internal changes in companies, e.g. restructuring of the company, as well as external factors such as the emergence of new customer requirements or the emergence of new, more productive technology.

In order to successfully achieve business goals, every company must define the base of its business. That base implies the definition of business processes, which are consistently implemented in all organizational parts. A formalized business description, through the definition of business processes, enables the development of a conceptual working environment by which the company can describe, monitor and manage its business. The complexity of the issue certainly implies the application of information systems, which implies strategic and operational harmonization of business functions and IT technologies within the company.

The idea of modern systems for managing business processes, although terminologically presented two thousand years ago, is not new. It originates from the product quality management system (TQM - Total Quality Management) and the enterprise resource planning (ERP - Enterprise resource planning) system. These systems, as well as the methods and technologies of business process reengineering (BPR - Business process reengineering), were aimed at improving business through the reconstruction, measurement and automation of business processes.

Business process management represents the continuation and evolutionary progress of these initiatives and is defined as a strategy for managing, improving and innovating business through constant optimization of business processes. This is achieved by cyclic application of business process modeling activities, their execution and measurement of achieved results. Business process

management represents a holistic approach of owners, management and employees, which promotes the effectiveness of business processes and their continuous innovation using flexible and integrative technology, with the aim of effectively adapting the company's organization to market demands and consumer needs. Coordination of activities in the business and IT domains is a prerequisite for the successful implementation of a business process management system.

Business process - definition and components

One of the first examples of recognition and description of production processes was given by Adam Smith in 1776, using the example of a nail factory. For a long time, business processes meant exclusively production processes. Today, a business process means a set of mutually dependent basic activities, which are carried out by business entities in time synchronization in order to realize business goals and increase income. A business process also includes a description of how basic activities are performed, as well as what active (people, knowledge) or passive resources (equipment, raw materials) the process has. Business processes are defined through their basic elements:

Inputs are material and information needed to perform the basic activities of the process, i.e. resources needed to achieve a certain result;

Outputs represent the data, information and material goods that the process generates. All outputs contribute to the achievement of the business objective;

Events serve to indicate some significant occurrences, such as the completion of a previous process or the satisfaction of some specific conditions. Events can also be used for time synchronization. The occurrence of events is asynchronous with the execution of the process, so events can occur before, during or after the execution of the process. Events can initiate the start, change of status or end of the process;

Subprocesses are used to describe logically rounded parts within a process that has a complex structure. Subprocesses have the same elements as processes;

Activities are the lowest level of execution in a process. During the implementation of the activity, data is generated that is archived in order to analyze the efficiency of the execution of the process and its price;

Resources include people, equipment, organizational units and all other entities participating in the process;

Performance measurement implies the measurement of attributes that help control the process, evaluate the efficiency of the process, as well as evaluate the degree of realization of the business goal. The role of performance measurement is to enable input planning, improvement of the organization and methods of process realization, as well as an overview of the achieved outputs in relation to the planned goals. Performance measurement results allow identification of the direction for process improvement.

Figure 1 shows the basic elements of the business process and their mutual interaction.

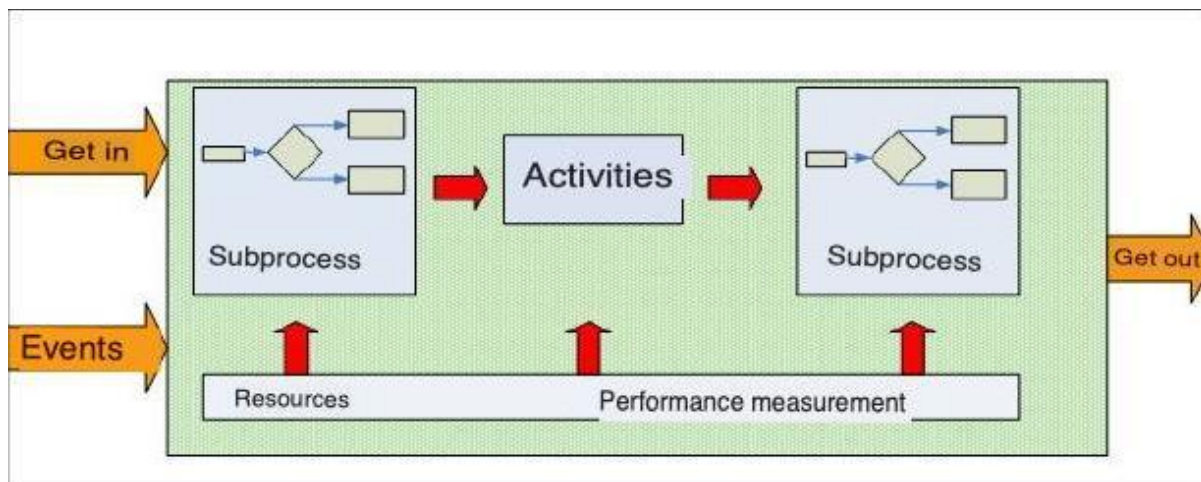


Figure 1. Process elements

From the perspective of the role of the process in the company, regardless of the individual specifics of each business process, three basic types of business processes can be defined:

Management processes, which aim at company management functions. For example, strategic planning and management;
Operational processes, which aim at the realization of basic activities within the company. For example, the processes of ordering, production, sales, etc.;
Support processes, which serve as support, primarily operational processes. For example, hiring new employees, training employees, etc. Until recently, activities in the field of information technologies were viewed exclusively in the light of support, but nowadays information technologies are becoming an important operational and strategic factor in companies.

Management of business processes

Centralized management of business processes and business policy implies the establishment of a chain of responsibility, authority and communication for its consistent implementation, in all segments of the company's life and work. The process of "governance" begins with a team of leaders who will define, implement and monitor changes in the organization and way of functioning of the company. Governance defines who makes decisions and on what principles, while management is the process of making and implementing decisions. Several levels of "governance" can be discerned.

"Corporate governance" is a set of methods by which a corporation creates, manages, administers and controls business objectives. For the successful implementation of business policy, it is necessary to achieve "alignment" (alignment) of the business and IT domains. The concept of strategic alignment of business and information technology was first presented by Henderson. He showed that IT (Information Technology) is no longer just a part of business, but has a strong influence on the creation of new business strategies and goals.

"IT governance" is an IT vision of "corporate governance", as an effort to use information technologies to achieve business goals. This includes the rights to make and implement decisions in the IT domain, as well as measure and control the effects of those decisions on business goals. This achieves the strategic alignment of IT with the company's operations, which significantly reduces business risks and increases the company's economic performance.

"SOA governance" (SOA governance) is a continuation of "IT governance" and is focused on the flexibility and reuse of services, as an abstraction of the business process, during the "life cycle" of the business process. The two basic functions are regulated by applying the principle of "SOA governance". The first function is defining the right to decide on new services from the aspect of information technology, while the second function refers to defining the right to decide on new relations between the business and IT sectors. SOA management provides answers to a large number of challenges that can be classified into four basic areas:

Establishing the right to decide on processes (services), which will be used multiple times at the company level. This involves defining who is responsible for creating shared services, their upgrade and the right to use them;

Defining which new services the company needs, which applications will use those new services, and which "legacy" services can be considered candidates for multiple use;

Management of the "life cycle" of services and existing applications, i.e. defining ways of efficient multiple use of services and existing solutions. This category also includes answers to the questions: "Who uses the services and what will be the consequences of changing the services?", "Who is allowed to change the services that are used multiple times?", "Who allows the changes to the services?" and "Whose responsibility is it to will the changes be in accordance with the specified requirements?";

Effectiveness measurement means defining who conducts performance measurement and who guarantees the application of standardized methods in performance measurement.

Figure 2 shows the basic elements of the working environment for the implementation of "SOA governance", as well as the relationship to business processes.

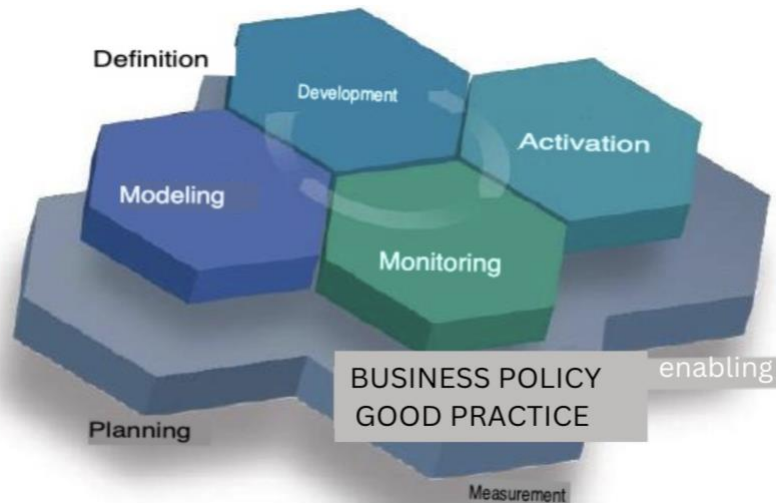


Figure 2. SOA governance and business processes

The basic phases of the working environment in the realization of "SOA governance" are: planning, defining, enabling and measuring.

Planning - in the planning phase management needs are established, the business strategy for IT and SOA is verified and documented. This is achieved by continuously redefining the service-oriented vision of the company, starting from the assessment of the current state of information technologies and the SOA project.

Dynamic changes in the field of information technologies impose the need to constantly review the currently valid management system;

Defining - in this phase management processes and methodologies are defined and modified. By identifying success factors and mechanisms for their measurement, the management model and its corresponding infrastructure are defined.

Enabling - Enabling a defined management model implies its publication (Deploy), with its implementation being an evolutionary process. Enabling the management of the company's IT infrastructure, of course, also implies education to achieve the expected behavior and acceptance of examples of good practice.

Measurement - In order to ensure compatibility with the company's global strategy, it is necessary to establish mechanisms for monitoring and controlling the management process. This can only be achieved by continuously measuring the achieved results and comparing them with the proclaimed goals.

The best way to successfully implement SOA governance is to establish a "decision center" (SOA Center of Excellence - SOA CoE) that combines expertise on examples of good practice and analysis of the current situation in the company. This center helps the company to timely adapt to changes and adequate transformation in accordance with examples of good practice in the company's field of business. This significantly reduces business risks and facilitates the achievement of defined business goals.

Designing a system for managing e-business processes

Business Process Management (BPM - Business Process Management) is a methodology for managing company resources and defining interactions between resources, with the aim of generating services or products according to client needs. Business process management is a comprehensive, comprehensive approach to improving business and adjusting the organization to market requirements. Globalization, the opening of new markets, high customer demands and fierce competition have forced companies to look for a way to quickly adapt to frequent changes. In the past, companies rarely had the need for significant changes, while today's market dictates the need for monthly, weekly, and even daily changes. The business strategy, which until now was primarily based on prices, must shift its focus towards "growth" - ie. to the goal, which implies the flexibility of the company and the expertise of the personnel. The market demands a high degree of business flexibility, but a company can only be as flexible as its information system can support.

According to the IBM SOA Foundation, the activities that make up business process management belong to one of the four basic phases of the process "life cycle". As shown in Figure 3, all business processes, the services that represent them, business and IT methodologies, form a single base for the application of business policy for the purpose of successful business.

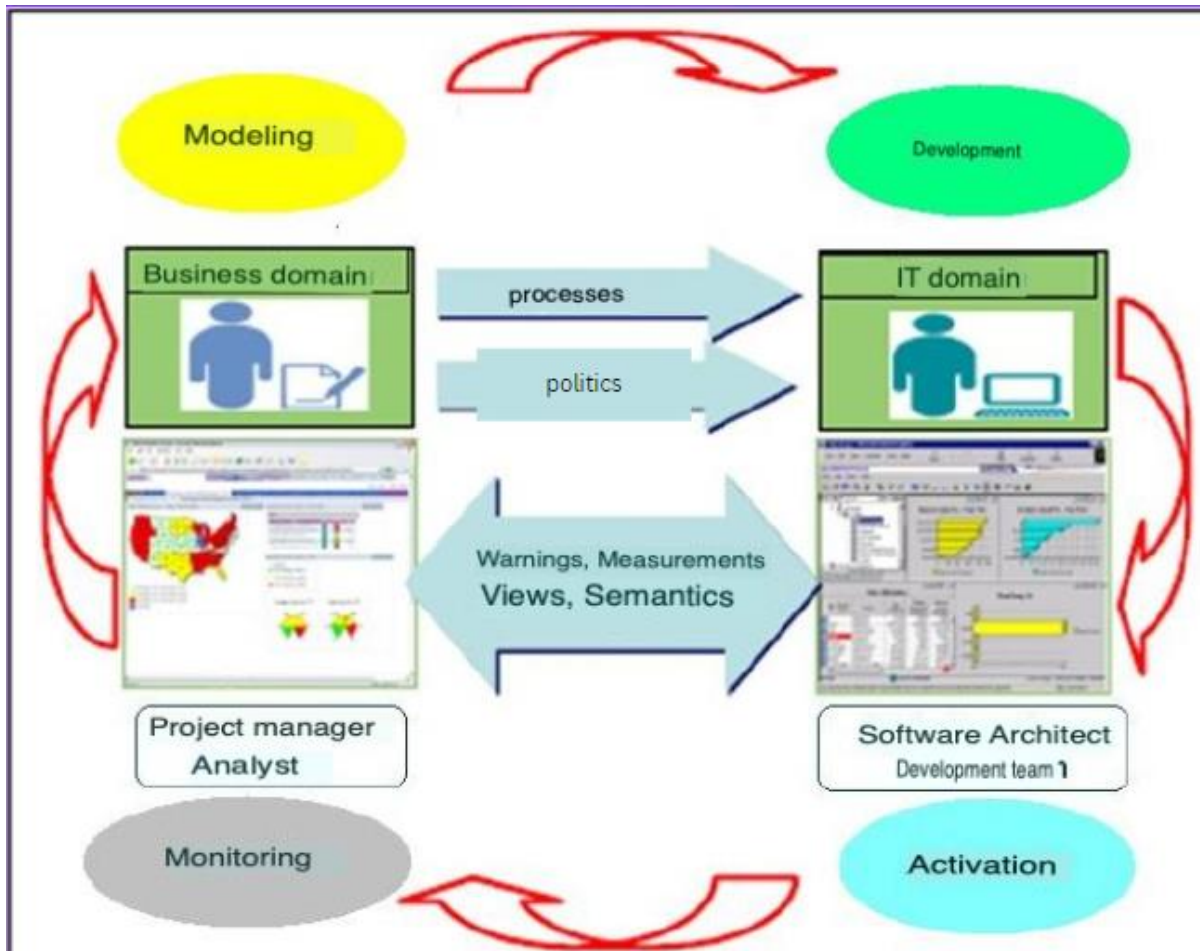


Figure 3. Stages of the "life cycle" of business processes

Although the concept of service-oriented architecture (SOA - Service Oriented Architecture) is primarily related to the IT domain, the application of the same principles has been extended to the field of business process management. In accordance with that service-oriented paradigm, business process management can be viewed as one composite application, which orchestrates business processes as services and thus integrates and automates business. Based on standards and principles of best practice, the service-oriented paradigm enables comprehensive, integrative improvement of business process management. Without the application of a service-oriented paradigm, it is possible to achieve only partial organizational or technological improvements, but the company's infrastructure still reacts slowly to changes, is inflexible and expensive. The cornerstone of the successful application of the service-oriented paradigm is, of course, knowledge of business issues in a specific domain. In addition to these basic knowledge, it is also necessary to know specific information technology knowledge, primarily from the aspect of service-oriented architecture application. Today, there are a large number of commercial and non-commercial organizations in the world, which aim to unify the knowledge of experts in the field of business and information technologies,

- Full understanding of the company's business strategy;
- Full understanding of the place and role of processes within the company;
- Full understanding of the process being modeled;
- Understanding of methods and resources from the IT domain.

Business system analysis

As the introduction of a business process management system is a complex procedure, which has strong and long-term effects on the entire company, it is necessary to perform an analysis of the business system beforehand. Business system analysis means a

set of tasks, knowledge and techniques necessary for identifying business needs and defining solutions to business problems. Solving business problems may require the creation of new products, the redesign of existing products, but it may also be based on the improvement of business processes or organizational changes. In contrast to the analysis of business requirements, business analysis focuses on identifying the changes that must be implemented in the company in order to achieve strategic business goals. In terms of importance and scope, these changes are of global importance for the company and include changes in business policy, business practice, the way business processes are managed and in the information system.

Due to the importance of the business process management system, the top management of the company promotes a suitable team, eager for design and implementation. The team, which includes business analysts and IT experts, undertakes activities aimed at:

- Identification of new business opportunities;
- Understanding the architecture of the business work environment;
- Defining the optimal investment plan for the implementation of new technical and business solutions.

In order to convert business requirements and goals into innovative solutions that adequately reflect the company's business needs, the role of the team is to facilitate the collaboration of business and technical structures within the company, eventually engage experts from outside the company, as well as to implement new IT solutions for business processes. This implies the realization of a certain set of tasks (Figure 4) regardless of the choice of methodology for the realization of the process, and independently of the choice of software tools necessary for the realization of this process. The mutual cause-and-effect dependence of activities in the business sector and in the IT sector once again indicates the necessity of harmonizing the business and IT sectors.

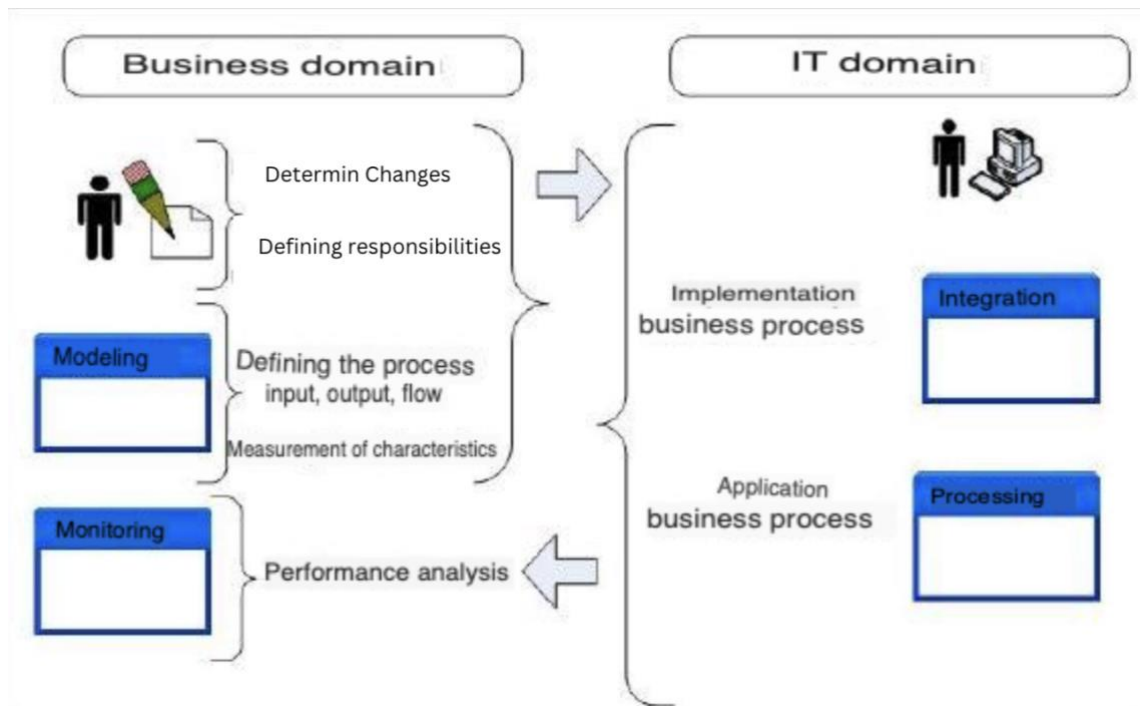


Figure 4. Analysis of business processes

Determining organizational changes and the bearer of responsibility

When a company starts introducing a business process management system, the first step is defining the changes that are to be made in the company. Business process management affects all resources and carriers of business activities, employees, consumers, suppliers and business partners. Understanding these changes is of crucial importance for the life of the company, and therefore the management must define the desired changes and foresee the corresponding organizational transformations and possible risks. In principle, there are two types of organizational changes:

Internal changes were initiated on their own initiative in order to define the original business process, or to innovate and improve the existing process. Such changes lead to the company's comparative advantages, but also have the highest degree of risk.

External changes represent a response to some external factor, for example the influence of competition. These changes can also arise as a response to internal changes implemented in another company, for example a significant business partner or a competing company.

In this preparatory phase, it is necessary to promote the manager responsible for the process as a whole. Although this manager is delegated all the necessary competencies for the implementation of the process, he does not replace the managers of individual organizational parts of the company. Some of the functions of this manager are:

Identification and definition of business goals;

Determining and documenting requirements for the realization of business goals;

Defining subprocesses;

Identification of critical success factors;

Establishment of measurement methodologies;

Monitoring of implementation, monitoring of implementation and achieved results.

Defining inputs outputs and process flow

After defining business goals and determining the authority for implementing the business process management system, a group of business analysts defines all aspects of business processes. This activity includes all critical success factors, primarily the input, output and flow of the business process. These are the factors whose incorrect evaluation determines the failure of the business process as a whole. During the implementation of this activity, appropriate software tools are actively used, eg IBM WebSphere Modeler Tool. The result of this activity is a model of the process and all individual elements in the process. From that moment, business analysts can propose improvements to business processes using business process simulation.

Performance measurement and analysis

The goal of business process management is the effective realization of business goals. Realization of business goals is possible only by implementing effective business processes, ie business processes that are in line with consumer requirements. The lack of process efficiency is measured by the degree of disagreement of the process results with the set requirements.

Business process analysts define the method of measurement and analyze the results, which is of crucial importance for understanding how business processes take place in practice. Measurement of characteristics and analysis of performance enables feedback between business process designers and subjects directly involved in the business process.

Defining the component business model

In order to respond to frequent changes in market demands and increasing expectations from customers, employees and shareholders, companies have implemented certain business tasks in a modular manner, in a way that can ensure the efficient execution of those specialized services. That decomposition of companies must be systematic, to enable the definition of the company's growth method on the basis of the company's comparative values. The existence of insight into the business processes, both existing and new, necessary for the further growth of the company, makes it possible to see which business processes can bring a comparative advantage to the company in relation to the competition. In the new, digital economy, companies should view the business process as a set of connected components, which affect strategic, operational, technical-technological, organizational and financial aspects of business.

According to IBM's predictions, by 2010, the most successful companies will be those that have focused only on the critical components of their business, the so-called "specialized companies". The ideal structure of these companies will be in the form of a network of modular business blocks. The path to a "specialized company" entails:

Decomposition of the business process into logical components;

Defining comparative differences.

The decomposition of the business model into discrete business components allows companies to recognize and focus on fundamental activities in the company, both from the aspect of the level of responsibility and from the aspect of business competencies. Defining comparative advantages, in relation to the competition, makes it easier for companies to decide where and how to invest. This achieves the harmonization of the company's strategy with newly created opportunities and the creation of new values, in a relatively short period of time. An example of a simple, logical and practical working environment, for demarcating between strategic decisions, management methods and ways of their implementation, is shown graphically in Figure 5.

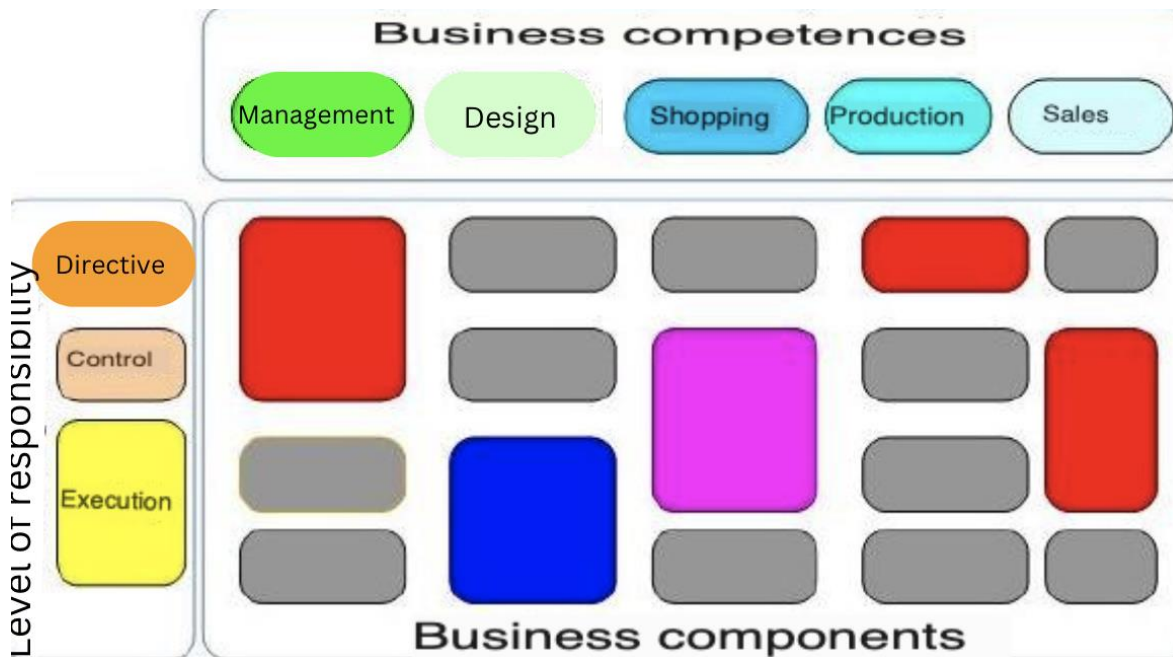


Figure 5. Model of business components

Business components represent a clearly defined set of activities, which are performed as a single, logically rounded whole. The basic purpose of the existence of an individual business component is reflected in its ability to, through the process of collaboration with other components, contribute to the satisfaction of a certain business goal. Each business component contributes to the realization of a specific business goal, by integrating the value obtained from its execution with the values obtained from the execution of other components. Business components require certain resources: people, information, knowledge and appropriate technical-technological tools and resources, which are necessary for them to successfully implement all their activities. Each business component implies a certain cost of its realization and performs its activity at a certain service level, i.e. at a certain level of responsibility within their business competence.

The level of responsibility implies the way of demarcation between strategic decisions - directives, management methods of checks - control and the way of execution - execution. Components at the strategic level provide strategic directives and define the company's business policy. These components also define the way of collaboration with all other components. Monitoring of implementation methods, performance measurement and exception management are performed by middle-level components, i.e. control components. Executive components create value for customers, business partners, or other components.

From a technological point of view, the method of realization of a component depends on its purpose. Executive components are implemented in a way that ensures the flow of information in real time, thus enabling the full employment of people and ensuring a high level of productivity. Unlike them, strategic components are not designed for high data flow rates, but, above all, should enable versatile and efficient business analysis.

Business competencies - represent the most general description of the type of value, which the business component provides to the company. The description should be simple, logical and adequately represent the set of activities that belong to that business competence. Business competencies should be defined in accordance with the organizational structure, which is most often applied in the domain of the company's activities, with adequate adjustments according to the specifics of the specific company.

The purpose of business process decomposition is to create a clear and transparent map of the essential business blocks of a specific company. The main value of this map is to show how well the company's organizational structure is in line with the declared business goals. This model shows if and where there are gaps, duplication of capacity, as well as other deficiencies at either the business or technology level. Based on the results of the composition of business processes, it is possible to create a business and technologically integrated road map for the development of the company, with the aim of increasing business efficiency. Defining the basic competencies of the company, measuring the achieved results and analyzing the way of investing are certainly prerequisites for the successful development of the company. The map of business components represents an excellent starting point for the development of operational insights into the way of doing business, as well as strategic analyzes of the company's

development directions. By looking into the way of doing business, it is possible to see which business or technological components require immediate intervention. From a long-term strategic aspect, it is of fundamental importance for the company to define comparative differences in relation to the competition. This is most easily established by analyzing your business processes and looking at which business or technological processes represent the basis of the company, i.e. its basic competencies. Attention to any aspect of the business, ie. individual business components, will vary over time. Some of the activities, which significantly define the company's operations, may significantly lose their importance today and even become secondary activities in the near future. This is the reason why the company has to adapt at all times, i.e. aligns its strategy with the opportunity to create new value. This continuous, iterative selection of strategic activities is a condition for the continuous progress of the company, and the dynamics depends on the domain of the company's activity as well as on the degree of its specialization. Products and technology can be copied. The business model is what represents the essence of a company's comparative advantage. The key to the company's success is defining what differentiates it most from the competition and how it can best cooperate with consumers and business partners. Globalization of the market makes companies more and more open and imposes the necessity of cooperation and collaboration. Innovating the business model allows the company to quickly adapt to the dynamic trends of the information age. Knowledge is becoming the key resource of any company, and the ease of obtaining new information is leading to a paradigm shift from "investigate here" to "innovate everywhere." Continuous innovation, both in the technical and technological domain, as well as when innovating business models, is the way to define comparative advantage.

Design and development of e-business process models

Designing and developing e-business process models includes the first two phases in the life cycle of business processes. In general, designing e-business processes boils down to modeling business processes using software tools and methods. Modeling is the process of abstracting real-world physical systems or processes. The modeling process itself has its own characteristics such as: target group, purpose, aspects of observation, content and level of detail. The process of making a model is done in several stages.

Business process modeling begins with the collection, documentation and analysis of business processes. The resulting model is generated through the multiple cyclical application of simulation, optimization, redefinition of requirements and review of the characteristics of the current model. This resulting model is used as a starting point for the development of a software service, which supports the modeled business process. During the business process modeling phase, methodologies for measuring and documenting process characteristics are also defined. The results of the application of these measurements serve, above all, for the validation and verification of business and financial improvements of the modeled business process.

After definition, the business process model is exported to the IT domain, where technical and technological data are added to it. At this moment, the business and IT domains are being integrated in order to define a common business process model. As the final result of the development phase, an executable version of the modeled process is obtained. This executable version of the business process can be fully implemented using one software service, or it can be implemented by orchestrating a number of new and existing services. All newly created services, necessary for the realization of the process, become part of the repository accessible to all organizational parts of the company. As the development phase starts from the business process model, the concrete implementation of the business process reflects all the essential characteristics of the model, which achieves a complete business orientation of the concrete implementation.

CONCLUSION

Business process management is based on the efficient implementation of business processes. In addition to the business perspective, a technological platform is also necessary, which enables the implementation and publication of readiness for the application of the business process management system. That technological platform must ensure the flexibility of the solution as a whole and the multiple use of individual components of the solution. Flexibility is necessary in order to easily implement business process improvements, while multiple use, in addition to financial benefits, is also necessary from the aspect of standardization and consistency. Service-oriented architecture is precisely the technological platform that fully meets the above criteria. Therefore, the development phase of the e-business process most often ends with the construction of a corresponding XML Web service, which represents the IT solutions of the business process. The phase of activating the e-business process, the third phase of the life cycle of business processes, involves configuring the work environment and installing the developed IT solution (XML Web service) on the business process server. This is the stage of integration of the business process with other resources (people,

processes and information) of the company. The environment in which the executable version of the process exists must ensure the reliable execution of the business process, with the possibility of dynamically redefining the process in case of changing business requirements.

The fourth stage of business process management involves monitoring execution, as well as measuring key performance indicators (KPI - Key Performance Indicator) of the observed process. Process performance measurement is enabled by generating events or synchronization signals for each step in the process. In this way, information necessary for diagnostics, generation of real-time warnings, isolation and elimination of errors is obtained in real time. The existence of this feedback link to the modeling phase enables continuous improvement of the entire business process management system. Monitoring the business model involves continuous measurement of key performance indicators, necessary resources, cost and value created by each business component individually. In this way, it is possible to see the contribution of each component to the satisfaction of business goals and the total income of the company. Monitoring the business model, in fact, represents the process of analyzing the success of the business and making decisions about the directions for further improvement, both of individual business components and of the business model in general. In doing so, it is necessary to focus attention on strategically important business components. These are those business components that create part of the value within the company's core competencies, thereby contributing to the positive positioning of the company on the market, while emphasizing comparative differences in relation to the competition. Most of the company's human, financial and other available resources must be allocated to strategically important business components.

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The mediating role of employee motivation in the effect of paternalistic leadership on organizational creativity

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Abstract

Paternalistic leadership is a culturally based leadership style which combines strong discipline and authority with paternal benevolence, loyalty, and integrity. The social and cultural characteristics reflected in paternalism makes it dominant in a society that has a collectivist culture as Turkey. The aim of our study is to find out the impact of paternalistic leadership on organizational creativity by identifying motivation as a mediator. To collect the data, the convenience sampling technique and to analyze the data, structural equation modeling has been used. Findings indicated that paternalistic leadership had a positive effect on organizational creativity whereas motivation had a positive effect on the relationship between paternalistic leadership and organizational creativity. The study provides a fresh practical and theoretical perspective on the underlying mechanism pertaining to the relationship among paternalistic leadership, organizational creativity, and employee motivation.

Keywords: Paternalistic Leadership, Motivation, Organizational Creativity

1. Introduction

Human is an indispensable element in every step of the production and presentation of goods and services. Today, no matter how advanced the technology in a sector is, it is still the human being who will use the developing technology. Because it is the human element that bears the burden of the enterprises, performs the production, and enables the enterprise to function like a living organism. Therefore, employee motivation is a very important issue for businesses. Employee motivation has a supporting power on employees' giving importance to their work, adopting organizational goals, and making efforts towards these goals. Therefore, employees with a high level of motivation will be able to contribute to the long-term profitability and survival of the enterprise with high morale levels in the enterprises they are in (Lakomski, 2008).

Today, leadership is accepted as the ability to consciously influence and direct people to achieve certain goals and objectives. A good leader does not only guide the employees in achieving professional success; At the same time, he is a person who gives them confidence, uses his persuasion ability and mostly motivates employees (Aycan, 2001). Leadership and motivation are important phenomena that direct employee behaviors within the organization and enable them to act in line with a specific goal. The most important resource that will make organizations successful is the human factor. Considering that organizational resources are limited, it can be said that the most important resource is human power and human potential. One of the most important ways of directing the manpower, which is the most important element that ensures the effectiveness and success of organizations, is to exhibit effective leadership practices and skills and to motivate employees (Pellegrini & Scandura, 2006).

Many recent studies have revealed the influence and importance of leaders on the creative behavior of employees (Soomro et al., 2020; Mumford et al., 2002). In this context, it is of great importance for leaders to implement the right strategies that can increase creativity in the organization. These studies have led researchers to explore how leaders can mobilize the creative participation of employees.

2. Literature Review and Hypotheses

2.1. Paternalistic Leadership

A leader is a person who motivates, inspires and influences others to act in line with a specific goal, and enables them to follow him willingly. Leadership is a process related to what the leader does (Pellegrini et al., 2010). A paternalist leader can be defined as the type of leadership applied by a manager who protects and observes the employees with paternal affection for their own well-being, and is involved in their lives outside the profession and workplace (Hayek et al., 2010). The concept of paternalism

concerns the characteristics of bilateral relations, mostly subordinate and superior duties and responsibilities. In paternalistic leadership style, the relationship between subordinate and superior is similar to the relationship between parent and child. In this relationship, the superior duty is to help, guide, protect the subordinate and make the decisions that he thinks will be good for the subordinate on his behalf. While the superior exhibits these behaviors, the behavior expected from the subordinate is obedience and loyalty. Paternalistic features are generally seen in family and state structures with feudal and patriarchal order. The state, which collects features such as "father" and "paternal father", is obliged to take care of its people. Over time, it has been observed that these relations within the family and the state are also reflected in the workplaces (Erben, 2004). The paternalistic leader tries to create a family warmth in the organizational environment. It establishes close and personal relationships with its employees, deals with the private lives of employees outside of work, expects loyalty, and wishes employees to pay attention to authority and status (Anwar, 2013). The paternalistic leader makes the employees working in the organization feel that they are a part of the organization. In order to make them feel this, they explain to the employees how they should do a new activity, and the employees who do / do not perform the work as required are rewarded or warned. It encourages the employees to take responsibility, and the employees know that their fatherly leaders will be happy when they solve any problems that may arise in their area of responsibility, as described, without any problems (Westwood, 1997).

Paternalistic leadership is an emerging research area in the management literature (Chou, 2012). Paternalistic leadership has emerged with emic approaches arising from the fact that the leadership theories developed in the west are not suitable for every culture. The studies that emerged with Silin's research on leadership behaviors in Taiwan in 1976 continued with the researches of Redding in 1990 and Westwood in 1997 and paternalist leadership approach specific to eastern societies emerged (Cheng et al., 2004:91). Paternalistic leadership is more successful and accepted in a wide range of power and collectivist country cultures (Pellegrini & Scandura, 2006). According to the findings of various studies, Turkey is among the countries with a high paternalism score and employees expect the leader or manager to be a paternalist. Studies conducted in Turkey show that paternalistic leadership style also has important effects on employee attitudes and behaviors (Pellegrini & Scandura, 2006; Erben, 2004). paternalistic leadership; It can be defined as a leadership style that combines authority and discipline with paternal benevolence and moral honesty (Ekmen ve Okçu, 2021). Paternalistic leadership, in which the leader guides the professional and private lives of employees like a parent, and in return is saddened by them.

Farh & Cheng (2000) examined paternalist leadership in three dimensions: benevolent, authoritarian, and moral (moral). The benevolent leadership dimension is the leader's personalized, long-term, and holistic concern for the well-being and well-being of his employees. It includes helping behaviors such as the leader's dealing with the personal and family problems of his subordinates, protecting, understanding and forgiving them. The authoritarian leadership dimension is that the leader reflects his absolute power and control over his employees. The leader wants to comply with his authority without being questioned (Erben, 2004). The moral leadership dimension, on the other hand, is that the leader creates a role model for his followers as a result of appreciated personal virtues, honesty, selfless and fair behavior and self-discipline (Farh & Cheng, 2000). In this study, paternalistic leadership was evaluated in parallel with the classification of Farh & Cheng (2000). It can be thought of as a hierarchical relationship in which he expects steadfastness and respect (Gelfand et al., 2007).

When the studies on paternalistic leadership dimensions in the literature are examined, two basic classifications stand out. The first of these has examined paternalist leadership in two dimensions as benevolent (benevolent) and self-interested and defined it in terms of the leader's intention and behavior towards followers.

The literature suggests that paternalistic leadership is positively correlated with organizational creativity. (Guo et al., 2018; Jia et al., Khorakian et al. 2021) The study by Wang et al. (2019) investigated that paternalistic leadership style reduces employee voice which in turn impacts on creativity and moral leadership facilitates creativity via employee voice. The study by Ağalday et al. (2021) determined that there is a the positive relationship between public primary school principals' paternalistic leadership behaviours and teachers' organizational creativity. Also the study by Khorakian et al. (2021) investigated that there is a relationship between paternalistic leadership and employee creativity in the tourism and hospitality industry, considering the mediating role of job embeddedness and the moderating role of career stage.

Given these findings, we formulate our hypothesis as follows:

Hypothesis 1. Paternalistic Leadership has a positive relationship on Organizational Creativity.

2.2. Organizational Creativity

The concept of creativity has been defined from different perspectives in the literature. Creativity is mostly defined as the ability to produce works that are both original (original) and appropriate (useful, adaptable to the task and work) (Amabile et al., 1996). Creativity is also examined in terms of process and result, bringing different solutions to an idea or problem; it is also considered as performing a job or product in a unique and different way (Mumford et al., 2002). Organizational creativity deals with the elements of creativity related to the business environment, companies and organizations, and in this context, it is defined as individuals working in interrelated social systems to produce valuable, useful, unique products, services, ideas, processes and operations (Woodman et al., 1993).

Although there are studies examining the antecedents and consequences of employees' work engagement attitudes, research on creative participation behaviors of employees is not sufficient (Atwater & Carmeli, 2009). Creative participation in work can be defined by the extent to which employees use their time, resources and efforts in work-related creative processes. It has been argued that paternalistic leadership also has a positive effect on the intrinsic motivation of employees. The kindness and tolerance of the paternalist leader contributes to the increase of morale and motivation of the followers by ensuring that the attitudes of the employees towards him are similar (Niu et al., 2009). Creativity can only be possible if employees have internal motivation at a level that can enable them to participate in their work effectively and authentically. Therefore, paternalistic leaders encourage creativity by affecting the motivation of employees (Amabile et al., 2004). In summary, it is expected that there will be a relationship between the paternalistic leadership behaviors of the leaders and the organizational creativity perceptions of the followers.

Creative participation in work; It is possible for employees to fulfill their duties by producing new approaches, to put forward original and innovative ideas, and to use known methods to produce new alternatives with different perspectives. Therefore, it is possible to say that creativity can take place not only in work-related special projects, but also in various business areas where employees operate daily. Participation in creative processes requires employees to identify problems, produce alternative, original, new products and ideas about their work, and dedicate themselves to improving their work behaviorally, cognitively and emotionally in this field. Therefore, creative participation in work can be seen as a precursor to innovative outputs, performances and ultimately innovation, and can be defined as an important element that complements individual and organizational success. Creativity is the ability of employees to have internal motivation at a level that enables them to participate in their work effectively and authentically (Amabile et al., 2004). Atwater & Carmeli (2009) found that intrinsically motivated energy affects the creative participation of employees in their work.

2.3. Motivation

The word motivation comes from the Latin word "movere", meaning "to move". Motivation concerns all the methods applied to ensure harmony in the goals of the employees and the organization. Motivation aims both to increase the efficiency of the business and to increase the satisfaction that the employees expect from the organization. Motivation is considered an important phenomenon that directs human relations. The essence of leadership is to direct the efforts of subordinates in line with the goals of the organization. The willingness of the employees, their acceptance of their work and their efforts will be possible thanks to the motivation of the leader. The main task of the leader is to keep the wishes of the employees alive and constantly; For this reason, it is to keep communication channels open in the organization, to allow employees to develop themselves and to develop them (Deci and Ryan, 1985). The main problem of all organizations is that the employees are not employed effectively and at the level expected from the employees in order to achieve the goals of the organizations. There may be reasons such as not being able to carry out their responsibilities at the desired level under the fact that the employees are not efficient and do not work. The inability of the employees to do their jobs successfully is one of the reasons for inefficiency, while the other part is the presence of unmotivated and unmotivated employees despite having the necessary competence. Some of the motivation theories focus on the external factors outside the person and around him rather than the internal factors inside the employee. These theories are based on the assumption that the movements of the employee are influenced and controlled by external factors. In this case, the problem is which external factors can motivate the employee. Managers and managed are two aspects of motivation. By using the motivation tool, the managers try to ensure that the employees do their work better and more concentrated, and therefore the resources are used in the most efficient way (Feng, 2009).

The factors that motivate employees may differ from person to person. For this reason, personal differences should be taken into account when using motivational tools. In other words, the tool that motivates an employee may not affect another employee because of their personal needs and priorities (Siyal et al., 2021).

According to Koçel (2005), "Motivation is a personal event." It is possible to define motivation as people's willingness to act and make an effort to achieve a specific goal. Motivation allows an individual to focus more on a job and do it more appropriately. Because if an individual does not want to do this action through an action, expecting success as a result of that action is like waiting for a bird to crawl. According to many motivational speakers, success comes as a result of motivation. Not every motivation results in success, but every success results in motivation. If we consider this under the heading of work motivation, as we mentioned in our introduction, if a worker tries to do his job in a motivated way, that job will be more productive.

People can be very eager to meet their needs. But this does not mean that the person's work motivation is high. On the basis of motivation, we can divide it into two; motivation to meet one's own needs, motivation to see one's employer's job better. The only difference here is the concept of selfishness. If a person is motivated to meet their own needs but not to satisfy the needs of others, it makes them selfish.

Anwar (2013) examined the effect of paternal leadership on employee outcomes in his study. According to the findings of the research conducted on the sample of 260 bankers, the benevolence dimension of paternal leadership positively affects the employees' job satisfaction, organizational commitment and innovative behaviors. While the autocratic leadership dimension is effective on employee motivation, it has been observed that the moral leadership dimension has no effect on any employee output.

Göncü, Aycan, and Johnson (2014) examined the relationship of paternalistic leadership and transformational leadership with the organizational behaviors of employees. According to the findings of the research conducted on 251 white-collar employees in 49 different organizations, both paternalistic leadership and transformational leadership strengthen trust in the leader and thus employees exhibit organizational citizenship behavior. According to the other finding of the study, paternalistic leadership strengthens the impression management motivations of the employees and thus it has been found to be positively related to organizational citizenship behavior.

Aslan (2015) investigated the role of work ethic in the effect of paternalistic leadership on employee performance in his study involving 401 public employees. According to the findings of the research, paternalistic leadership positively affects employee performance. In addition, work ethic has a moderating effect on the effect of paternalistic leadership on employee performance.

Hypothesis 2. There is a positive relationship between paternalistic leadership and motivation.

Hypothesis 3. There is a negative relationship between motivation and organizational creativity.

Hypothesis 4. Motivation has a mediating effect on the relationship between paternalistic leadership and organizational creativity.

3. Methodology

3.1. Sample and Data Collection

A convenience sampling method was used in the present study. The study included 126 participants.

In the study, 49.2% of the participants were female and 50.8% were male. Based on the educational level, 19 % of the participants were high school graduate, 68.3% were graduate and 23.9% were postgraduate. Among the participants, 19.8% had been working in their institutions from one to five years, 29.4 % from 6 to 10 years and 17.5% had been working from 11 to 15 years.

3.2 Scales

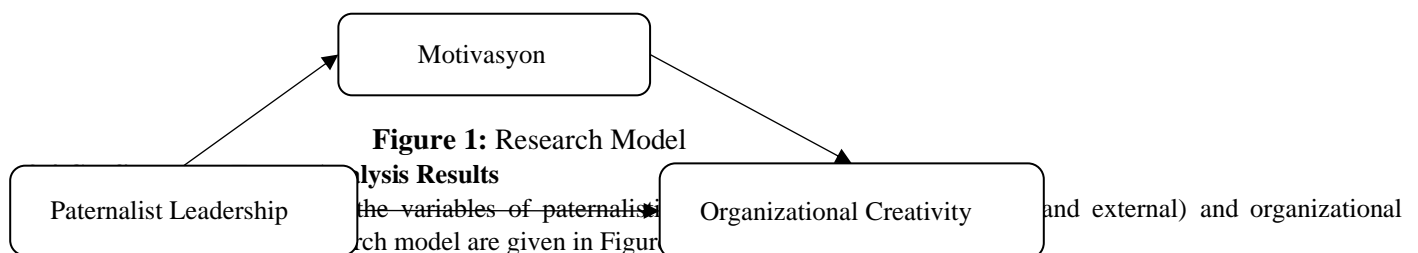
The 10-item Paternalist Leadership Style scale, developed by Aycan in 2006, is one of the scales used. According to the research data, the reliability coefficient of the scale -cronbach alpha value- was found to be 0.957 (Aycan et al., 2013).

Teacher motivation scale developed by Taşpınar was adapted by Polat in 2010. Scale; It consists of 24 items, 12 of which measure intrinsic motivation and 12 items of extrinsic motivation. The cronbach alpha coefficient of the scale is 0.94.

The Organizational Creativity scale was introduced to the literature by Çavuş (2006) to determine organizational creativity. The scale consists of one dimension and 21 statements. The reliability coefficient of the scale - the Cronbach alpha value - was found to be 0.967.

For all scales; responses of the participant; Strongly agree=5, ..., Strongly disagree =1.

3.3 Research Model



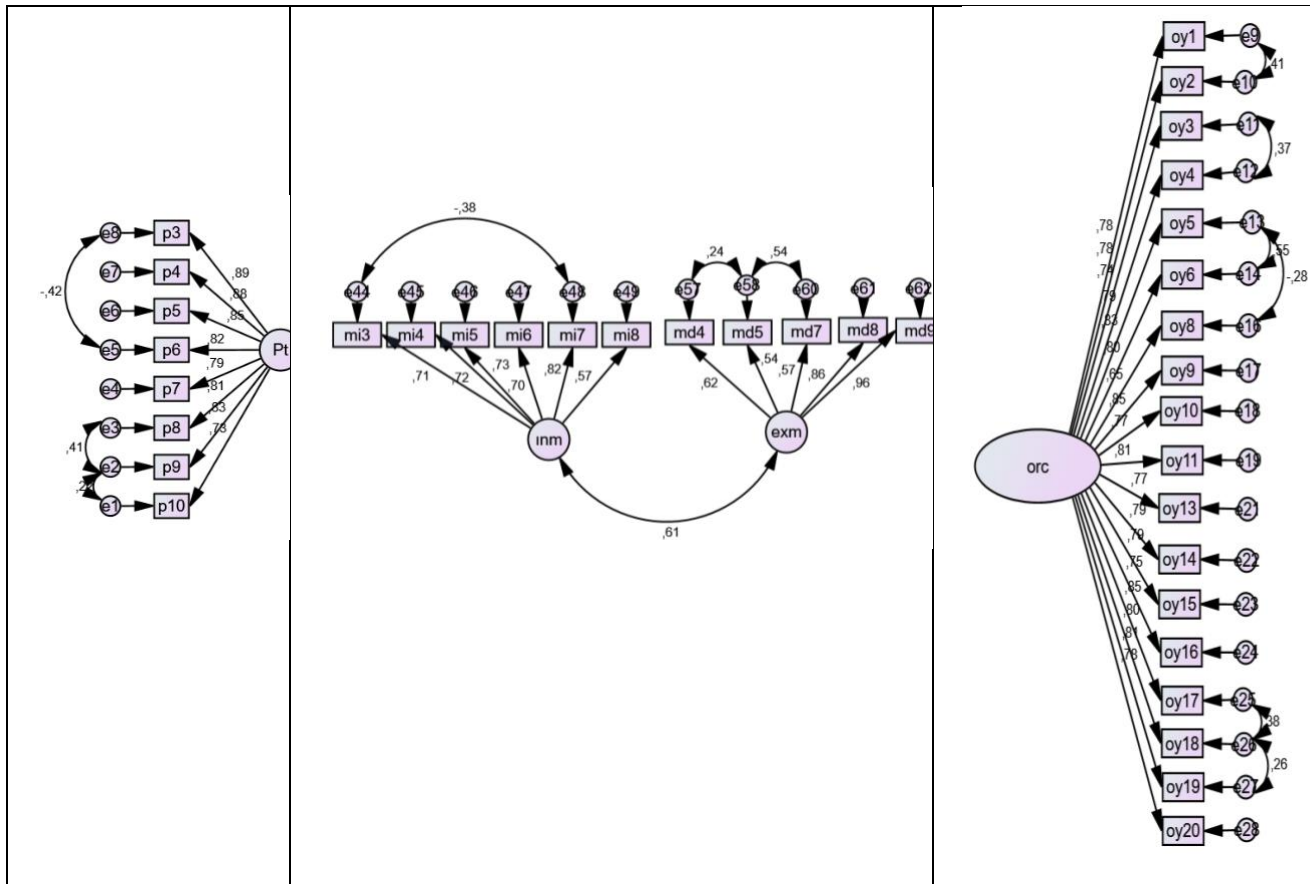


Figure 2: Confirmatory factor analysis

When the goodness of fit values for all three models are examined, it is seen that they are within acceptable ranges (Table 1).

Table 1: Confirmatory factor analysis results

	CMIN	DF	CMIN/DF	RMSEA	GFI	CFI
Paternalist Leadership	28,973	17	1,704	0,075	0,948	0,986
Motivation	61,619	40	1,540	0,066	0,920	0,968
Organizational Creativity	243,345	129	1,886	0,084	0,821	0,943
Goodness of Fit Index Value			≤ 3	≤ 0,05	≥ 0,90	≥ 0,97
Acceptable Goodness of Fit Values			≤ 4-5	0,006-0,008	0,89-0,85	≥ 0,95

Structural equation model analyzes were performed with IBM AMOS V24. The mediation model was tested according to Baron and Kenny. The program was run first without the mediating variable (Figure 2), and then by including the mediating variable in the model (Figure 3), and the results in Table 2 were obtained. For the structural equation model goodness of fit values, the

publications of Bayram (2013, p.78) and Gürbüz (2021, p.38) were taken as reference.

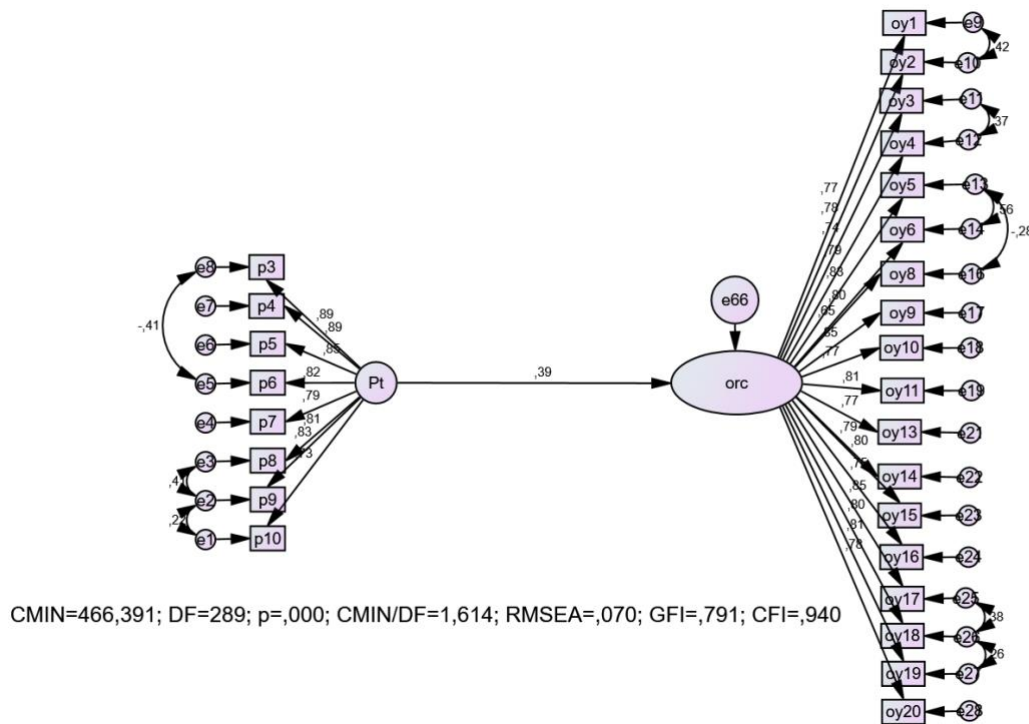


Figure 3: The model without the mediating variable

In the model in Figure 3, a significant relationship was found between paternalistic leadership and organizational creativity.

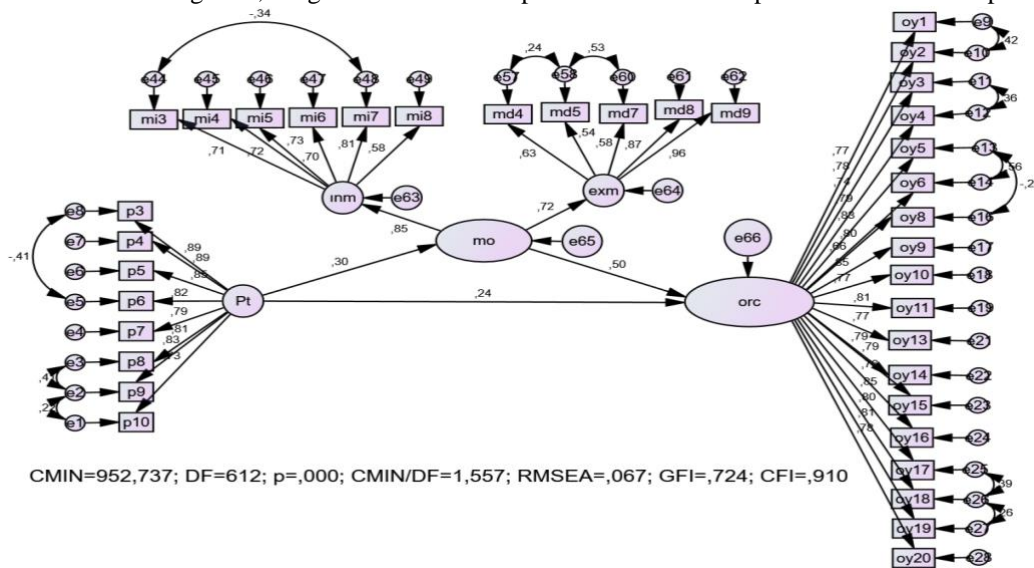


Figure 4: The model with the mediating variable

When Table 2 is examined; In the model where motivation (mediator) is not included, it is seen that there is a significant relationship between paternalist Leadership and Organizational Creativity. When the motivation variable was included in the model, significant relationships were observed between paternalist Leadership and motivation, and between motivation and Organizational Creativity. Although the relationship between Paternalist Leadership and Organizational Creativity is significant, it is seen that the strength of the relationship decreases according to the model without a mediator variable. In this case, it can be said that motivation is a partial mediator (Figure 4).

Table 2: Structural equation model analysis results

	B1	B2	S.E.	C.R.	P	B1	B2	S.E.	C.R.	P
orc<--- Pt	0,392	0,401	0,099	4,063	***	0,241	0,246	0,092	2,679	0,007
mo<--- Pt						0,305	0,179	0,07	2,565	0,01
orc<--- mo						0,498	0,867	0,227	3,817	***

Hypothesis results are given in Table 3.

Table 3: Hypothesis results

		Model without the mediating variable	Model with the mediating variable
H₁	Paternalist leadership style has a significant effect on organizational creativity.	Accept	Accept
H₂	Paternalist leadership style has a significant effect on motivation.		Accept
H₃	Motivation has a significant effect on organizational creativity.		Accept
H₄	Motivation mediates the relationship between paternalistic leadership and organizational creativity.		Accept

Conclusion

Regardless of the level of business, every manager has to deal with the issue of motivation. Because the basis of the management work is to employ the individual, to work with the individuals, to work willingly in line with the organizational goals of the individuals who make up the work team; is to ensure that they spend their knowledge, talents and skills in this direction.

The phenomenon of globalization experienced in the whole universe and the changes and developments experienced in all matters with this phenomenon have caused information to gain greater importance. The time we live in is now an information age and this information age is witnessing great progress and changes in every field. The phenomenon of leadership has also taken its share from these changes. A leader who wants to achieve the performance he expects from his employees has to motivate his employees. The leader can also use motivation as a functional tool to increase organizational efficiency and effectiveness. For these reasons, it is thought that paternalistic leadership, which is a leadership understanding, can affect motivation.

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Green marketing as part of corporate strategy in gaining a competitive edge

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Abstract

Environmental protection has become an important topic not only in the life of each individual, but also in businesses and in public all over the world. Globally, significant efforts are being made to minimize negative impacts on the eco-system. Changes taking place in the natural macro-marketing environment made the companies adopt the concept of green marketing and integrate it as a part of their corporate strategies. Green marketing is based on the creation of a green product, definition of the green pricing, green promotion and green distribution of products to ensure the long-term well-being of consumers, i.e. society as a whole. The implementation of green strategies requires high initial investments, but in the long run it provides money savings. Socially responsible companies follow the concept of green marketing, and consequently they modify business and/or production processes, thus contributing to the environment protection, entering new markets, maximizing profits and creating conditions favorable for gaining a competitive advantage based on the production, i.e. the sale of the environmentally safe products. On the other hand, a socially responsible consumer favors a green product over a traditional one in satisfying the same need. Awakening ecological and environmental awareness in each individual is a process that requires a lot of time and effort.

Keywords: green marketing, corporate strategy, social responsibility, green consumer, competitive edge, environment.

1. Introduction

The times we live in are characterized by: accelerated economic processes, the use of advanced technology in the production process, fierce competition, liberalization and globalization, the creation of multinational companies and their marketing channels, large factories, sophisticated consumers, uncontrolled shopping, flooding with propaganda messages, increased availability of various products, non-ecological propaganda materials, the use of environmentally harmful packaging, etc., which caused excessive pollution of the environment and unnatural processes (climate changes, natural disasters), which endangered the life of every individual on the Planet. All this requires socially responsible behavior of both consumers and companies, that is, society as a whole. From the point of view of companies, social responsibility in terms of environmental protection is reflected in the adoption of the concept of green marketing. The implementation of the concept of green marketing is realized through the integrated efforts of the company in product creation, pricing, promotion, as well as product placement while gaining profit through satisfying consumer needs and preserving the environment.

The focus of green marketing is to satisfy the needs of consumers while preserving the ecological balance. This is achieved through the production, consumption and disposal of eco-friendly products, i.e. environmentally safe products. The production of eco-friendly products takes place by applying clean technologies and preserving of non-renewable energy sources. Green marketing includes various activities related to modifying products, changing the production process, ecological packaging, as well as the use of biodegradable promotional material. Also, the implementation of green marketing activities presupposes a change in the disposal of products in a way that minimizes global warming, the creation of non-degradable solid waste, as well as the accompanying consequences for the health of every individual on the planet. Green marketing is the process of managing, identifying, predicting and satisfying consumer needs while achieving sustainability and profitability. It follows that green marketing is necessary, socially responsible and sustainable. According to the American Marketing Association: "Green marketing is the marketing of products that are assumed to be environmentally safe".

Environmental issues permeate the company's corporate culture. Socially responsible companies should embrace green marketing as part of their corporate strategy. Consequently, green marketing activities should be incorporated into the implementation of corporate policies, programs and activities, whereby the company contributes to environmental protection while

achieving profitable business. The desired outcome of green marketing is the exchange of green (environmental) products. Green consumers as demand holders are the driving force for the implementation of green marketing activities. They are ready to invest money, time and energy to satisfy their need for green products, thereby influencing the improvement of the environmental performance of the product, as well as of the company itself. In the short term, the development of green behavior and consumption may appear to be expensive, but in the long term, this will prove to be an extremely profitable and economical process.

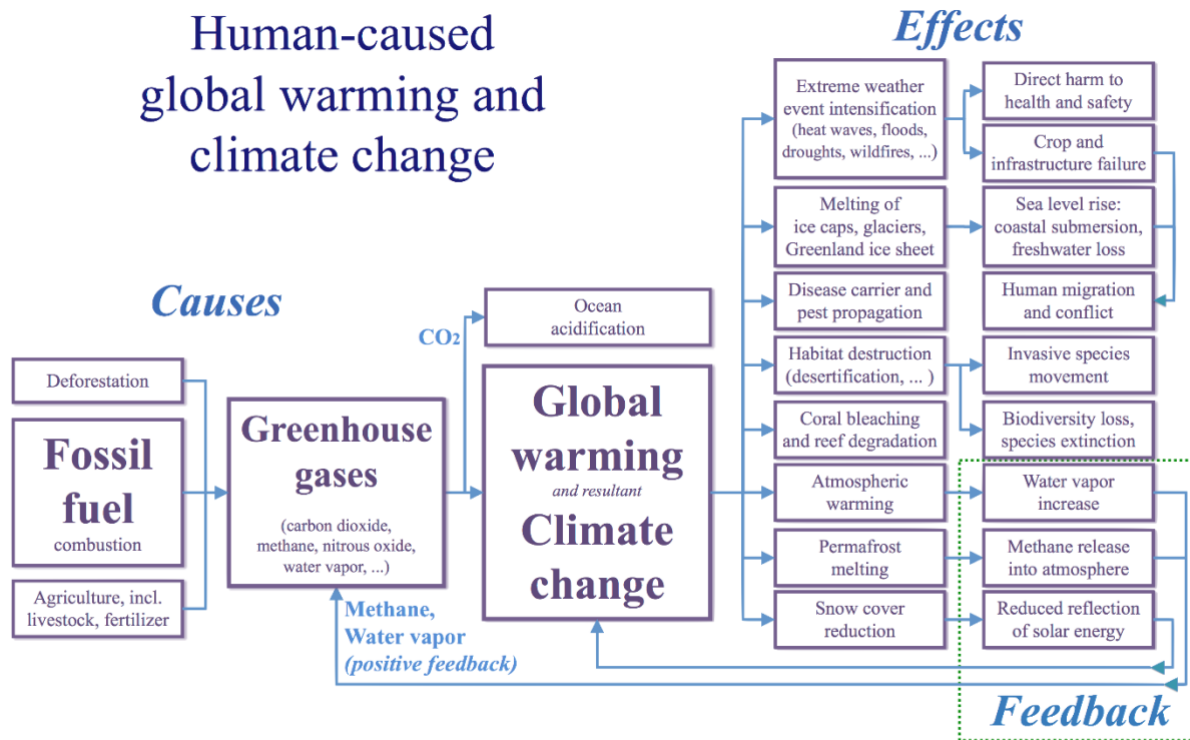


Figure 1. Global warming – climate change – causes effects feedback

Source: https://commons.wikimedia.org/wiki/File:20200101_Global_warming_-_climate_change_-_causes_effects_feedback.png (15.10.2022.)

2. Literature Review

"Green" or "environmental marketing" encompasses any efforts aiming to foster social-ecological harmony through increased human contact while minimizing environmental effect (George, George, 2022). Therefore, green marketing includes a wide range of activities related to product modification, production process change, ecological promotion, use of recycled or returnable packaging, etc., all with the aim of minimizing the harmful effects of production, consumption and disposal of products on the environment. „Green marketing has an impact on strengthening brand performance. Green marketing has a positive effect on brand knowledge. Brand knowledge acts as a moderator between green marketing and brand performance“ (Ye ğin, Ikram, 2022). The modern consumer should be aware that ecological products are not inferior to traditional ones, but on the contrary, that they have an ecological nature, that they are safe and healthy products. Green awareness influences purchase intentions of lodging consumers directly and indirectly (Zhang, Ainn, Bashir, Haq, Bonn, 2022). It is of utmost importance to create a growing awareness of pollution and its consequence which would be an incentive for the development of green consumerism.

Eco-labelling, green packaging and branding, and green product, premium, and price were all shown to have a substantial and favourable effect on customers' intentions to make green purchases (Majeed, Aslam, Murtaza, Attila, Molnár, 2022). Brands, which are rapidly progressing towards greening their production and marketing strategies, are now competing in green markets

where the environmental concerns of consumers are taken into consideration, and where green products, which are made from recycled materials, are longer-lasting and healthy, are reusable after consumption, and have less harmful packaging, are offered to consumers (Ye ġin, Ikram, 2022). Green marketing refers to the type of promotional messages that appeal to the needs and desire of environmentally concerned consumers and it typically involves the usage of claims that emphasize the brands' commitments towards environment (Georgie, Varghese, Sali, 2019). The brands which believe in innovation, green revolution and its marketing represents opportunity for growth (Priti, 2021). Companies are increasingly using green product research to assist in modifying their products and processes to make them more environmentally friendly in response to increased demand for such products (Bravo, Vieira, Rebello, 2022).

Green communication and networking is essential to the sustainable development of not only ICT industry itself, but also the whole economic value chain (NIU, 2020). While the shift to "green" may appear to be expensive in the short term, it will definitely prove to be indispensable and advantageous, cost-wise too, in the long run (Mankani, 2018). Scientists prop up green marketing to energize individuals to utilize ecologically best choices and to propose motivations to producers that create more ecologically advantageous products (Jothikumar, Baby, 2021). The company's socially responsible operations require modification of the production process, use of clean technologies, recycled materials, changes in packaging and modified advertising methods. With heating looking largely, it's important that green marketing becomes the norm rather an exception, or simply a fad (Nayak, Malde, 2021).

Green marketing is essential to protect the world from pollution, so if all countries formulate strict rules, it will come with a considerable change in the business world (Hooda, Jaggarwal, 2021). Business companies should be honest with themselves when they adopt green marketing because lying is a short way, with dreadful end, that results in losing credibility in the market (Sedky, AbdelRaheem, 2022). Consumers, companies and government bodies play a crucial role in the successful implementation of green consumerism. The main motives of companies for adopting the concept of marketing are: social responsibility, development of environmental awareness, strengthening of corporate image, sustainability and profit maximization, long-term reduction of costs, positioning of the company as ecological and energy efficient, emphasis on competitive advantage, entry into green markets and competition with other socially responsible companies, as well as respect for environmental regulations.

3. Methodology

This research was conducted using information collected from secondary sources, such as: relevant literature, scientific journals, research studies in the field of environmental protection and sustainable development, websites and other relevant and reliable sources. The aim of this research is to investigate the concept of green marketing, as well as the challenges and effects of its implementation. The research provides a better insight into the necessity of incorporating green marketing activities into the corporate strategy.

4. Results and discussion

All green marketing strategies are carefully planned and implemented based on the analysis of their impact on the environment, that is, on society as a whole. These strategies are part of the corporate strategy. The basic instrument of green marketing is a green product whose process of creation, production and sale is based on ecological benefits. Creating a sustainable (green) marketing environment requires partnership cooperation of all stakeholders in the supply chain. When developing products, companies should focus on unique product benefits for which consumers will be willing to pay a higher price. An environmentally conscious consumer behaves in an ecologically responsible manner, and consequently will be motivated to choose an ecologically safe product instead of non-ecological products offered by competitors, and even to pay a higher price. On the other hand, environmentally conscious companies use their traditional marketing mix concept, i.e. they should consider the 4P concept in the context of the green marketing mix, which consists of: green product, green price, green promotion and green placement.

Green products have focal importance for sustainable development, because its production process is based on the minimization of non-renewable sources and pollution. The creation of these products uses natural ingredients or those that are recycled, reusable and biodegradable, that is, those that are environmentally friendly. It is also typical of the green products that they contain only environmentally safe and verified chemical contents, as well as that no animal testing was conducted. These products are long-lasting and can be reused as a whole or partially. Green products meet the same needs as traditional products, but their negative impact on the environment and health is reduced.

Companies should develop a green brand positioning strategy. The role of a green brand is to communicate with target consumers and effectively differentiate green values. The green brand makes it easier for environmentally conscious consumers to find their way on the market, because it allows them to identify products that they perceive as green products, provides them with a guarantee and reduces the risk when purchasing, thus facilitating the decision to purchase healthy and environmentally safe

products. Successfully positioned green brands have significant environmental advantages over other brands in the minds of consumers. We can say that green brand image successfully allows firms to increase green purchases by employing the strategy of green products, premium and pricing as consumers pay more for the environmentally friendly product compared with an environmentally inferior product (Sedky, AbdelRaheem, 2022).

Eco-labels are indicators that the company meets the required green standards. They appear in the form of symbols, logos, color codes, etc. They are a tool for sustainable development, as they help consumers identify, gain trust and buy green products. The organisations should clearly state the environmental benefits, justify the comparative differences, and should consider the negative factors and firms being socially responsible should take into consideration that present environmentally responsible action might be harmful in the future (Priti, 2021).

In practice, it happens that companies have an eco-label for products, but do not have a fully developed ecological culture, because the entire business is not “green” but only certain products, services and processes. In the appeal to ecological culture, the terms: “eco” (“adapted to the environment”, “green” (“friendly to the Earth”) and “sustainability” (green business) are used. A special risk regarding the implementation of a green business concept is greenwashing, i.e. eco-manipulation. The companies practising green marketing need to be truthful in their practices and claims (Priti, 2021). Eco-manipulation refers to the transmission of misleading information about products to give consumers the impression that the company offers environmentally friendly products. The consequence of this is the creation of confusion, mistrust and dissatisfaction among consumers, which negatively affects their intention to buy green products. Greenwashing not only affects the customer in terms of their trust and commitment towards the company, but it also impacts the company’s reputation (Zhang, Ainn, Bashir, Haq, Bonn, 2022).

The green price is closely related to the quality of the product and its environmental safety. Price has a significant impact on green consumption. The promotional campaign should emphasize the long-term advantages of green products compared to non-green products, because the environmental awareness of consumers and the need to preserve health will make consumers behave green, and consequently they will be willing to pay a higher price.

Green promotion has the role of providing environmentally friendly communication, the goal of which is to inform, encourage and convince consumers to turn to green values, i.e. green consumption. Consequently, promotional activities should raise environmental awareness among consumers, convince them to adopt a green style of behavior and convince them that green products are not inferior to non-green products, but on the contrary, that they are healthy products. Therefore, the purpose of ecological communication is to educate consumers about the importance of environmental protection and the value of multiple use of products, to create preferences for green brands and to stimulate demand for them. The propaganda campaign should also be based on sending messages that the company has a green certification, as well as behaving socially responsible in terms of environmental protection. On the other hand, ecological communicative activities should encourage consumers to support green initiatives and to engage in environmental actions. Messages broadcasted to target audiences should create realistic, not exaggerated, green expectations.

Green promotion includes all communication tools as well as traditional promotion. Unlike traditional promotional material, green promotional material is exclusively made and distributed from recycled materials. The development of modern information and communication technologies has enabled cheaper communication compared to traditional advertising through printed media (catalogues, newspapers, magazines, billboards). First of all, the importance of marketing content should be emphasized, which is based on the creation and broadcasting of online materials (blogs, webinars, guides, videos, applications, presentations, email, newsletter, e book, etc.), and whose role is reflected in increasing interest for the brand and its purchase, reducing costs, as well as creating consumer loyalty.

Green distribution ensures availability of green products. The availability of ecological products awakens the ecological awareness of consumers. Developing a green style of consumption requires green products to be widely available on the market. This requires management of both physical distribution and distribution channels in a way that will reduce energy consumption and minimize negative effects on environmental protection. The focus of logistics activities is on ecological packaging. The location of these products should visually attract consumers and emphasize their ecological values.

The traditional marketing mix concept in green marketing should be expanded by including the following instruments:

- **Publics:** "Public" is a group of external and internal people involved in the green marketing program. External publics include the target audience, secondary audiences, policymakers, and gatekeepers, while the internal publics are those who are implicated in some way with either approval or implementation of the program (Georgie, Varghese, Sali, 2019).
- **Partnership:** Any major social change, including "green" behavior, requests partnership activities, because they are too complex for individually solving. Connecting with other groups and teams strengthens potential of efficacy.
- **Policy:** Often, policy changes are required, and media support programs effectively complement the green marketing program (Hooda, Jaggarwal, 2021).

- Purse Strings: This component of marketing mix focuses on the „cost“. How much will this strategic effort cost? Who is funding the effort?

All these marketing tools are combined to satisfy consumer needs and preserve the environment. In general, there are four categories of green consumers (George, George, 2022):

- Behavioral Greens – These customers purchase only products services that help to improve the natural environment.
- Think Greens – These customers frequently purchase green products or services, but when time, cost, or inancial resources intervene, they choose not to.
- Potential Greens – However, they may act environmentally friendly when influenced or encouraged by others.
- True Browns – These customers often avoid any firm that sells products or performs services with an environmental focus.

Adopting a green marketing concept provides a company with opportunities to gain a competitive advantage. Competitive advantage can be achieved in the following ways:

- Competitive advantage based on product differentiation is achieved by delivering something that is unique and valuable to consumers. The uniqueness of the product can be ensured through its environmental advantage (safety), which creates a sense of security and trust and provides greater satisfaction in consumers because that product impacts the environment positively and therefore company is acting socially responsible. Environmentally-oriented companies during the production and launch of products have the opportunity to enter new market segments, to increase profits and gain a competitive advantage thanks to their ecological product, which becomes more attractive compared to non-ecological ones.
- Cost-based competitive advantage is provided if the company has lower costs compared to its competitors, and at the same time has satisfactory profit margins. This is achieved by using renewable energy sources.
- A competitive advantage based on a niche market is obtained when a company directs its offer program towards a niche market, whose needs it effectively satisfies.

Green marketing has made firms increasingly competitive by pushing them to incorporate greenness at every stage, from choosing the raw material to the end of the product life cycle (George, George, 2022).

Green marketing makes it possible to achieve the following effects, which contribute to sustainable development:

1. Minimizing all activities that cause degradation, pollution, destruction and excessive consumption of natural resource;
2. Increasing demand for organic products;
3. Reducing the consumption of processed products in favor of the consumption of plant products;
4. Minimizing the use of pesticides, developing organic production;
5. Reducing the use of plastic materials. Millions of tons of plastic are found in the waste, unfortunately they reach rivers, lakes and seas, endangering the lives of animals. Plastic bottles should be replaced with reusable ones. Also, instead of plastic bags, it is necessary to use cotton tote bags or shopping baskets;
6. The use of sustainable paper packaging, which protects the forest, which is invaluable for preserving the natural balance;
7. Use of natural cosmetics and cleaning agents, herbal medicines and therapies. If these products are not produced and used in an ecological way, they can significantly disrupt the ecological balance, because they contain toxic materials that pollute water, soil and reach the body of various plants and animals;
8. Investing efforts in the recycling of waste of consumer and industrial products. System solutions should be developed so that the waste does not end up only at the landfill, but that it enters the production process again;
9. Reduction of energy consumption, especially from non-renewable sources, which is achieved by an ecological (clean) approach to the production process and transport. The focus should be on saving electricity, which uses different natural resources and has a negative impact on the environment, as well as intensively developing alternative sources of energy that do not pollute;
10. Strict legal, technical and technological measures regarding the protection of forests, water, flora and fauna from pollution;
11. Adopting strict norms for pollution monitoring and control;
12. Spreading environmental awareness through educating the population about environmental problems and solutions. Around the world, June 5 is celebrated as the World Environment Day, so the global awareness of the necessity and means of preserving a healthy environment can be spread;
13. Development of a green culture in which consumers support and initiate activities that contribute to environmental performance by demanding social and environmental responsibility from producers, but also from themselves.

5. Conclusions

The disturbed ecological balance due to global warming, non-degradable solid waste, various pollutants requires a change in the behavior of each individual in order to preserve the environment and a healthy Planet. The majority of consumers still do not have a developed environmental awareness, which requires various promotional activities with the purpose of educating consumers and

raising their environmental awareness about the benefits of using green products and encouraging them to buy and pay for the satisfaction of the same need and the higher price of these products compared to traditional ones in order to preserve their health. The production of green products requires clean technology, high investment in research and development, as well as the use of renewable and recyclable materials which also requires high investment. These products have great growth potential which further contributes to the creation of economic benefits, the creation of new jobs and sustainable economic development. The company's integrated efforts should encourage the development of green consumerism and prevent environmental degradation. Green marketing should not be considered a separate marketing norm but a component of holistic marketing, which is incorporated into all business activities of organizations regardless of their size and activity. The biggest incentives for the adoption and implementation of green marketing as part of the corporate strategy by companies are: sustainable development opportunities of the company; long-term economy and profitability based on ecological consumption and waste reduction; development of corporate identity, image and reputation through socially responsible behavior and in terms of environmental protection; policy that imposes the implementation of regulations on environmental protection; market position and environmental activities of competitors.

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Consumer Mentality as a Factor in the Development of Environmental Awareness

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Abstract

Within the current economic system of continuous growth and development, as well as the modernization of technique and technology, the rise of living standards and the evolution of lifestyle, there is a constant danger that as consumers, we "fall into a pattern" that, in the long term, is destructive for the environment and that causes a whole series of environmental and social problems. Environmentalists list the three most common causes of environmental pollution: population, technology and consumption. According to them, consumption is the factor that is given the least importance and actually has a dominant influence. The selection and consumption of goods is a reflection and function of our culture, that is, more broadly defined: our mentality. Mentality is a very complex concept. In principle, the consumer mentality is a contrived ideology that was born in the United States of America and then tended to spread throughout the world because it was necessary to develop the desire of consumers to earn and spend as much as possible, to impose a new system of values and the "obligatory trend" of luxury. Considering that both mentality and culture are dynamic and changing categories, in the literature, through the introduction of holistic marketing, the change in consumer habits and the development of the trend of satisfying needs and desires in a way that includes socially responsible actions, respect for wider interests through an ethical context and development of ecological awareness. Ecological consciousness is a reflection of social consciousness and a historical category that arises in concrete socio-historical conditions, when the ecological balance has been disturbed, that is, an ecological crisis. Ecological awareness, therefore, represents the basis of solving the ecological crisis through its elements, namely: ecological knowledge, ecological behavior and evaluation of the ecological situation.

Keywords: environmental awareness, consumer mentality, socially responsible behavior

Potrošački Mentalitet kao Faktor Razvoja Ekološke Svesti

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Rezime

U okviru sadašnjeg ekonomskog sistema neprestanog rasta i razvoja, kao i modernizacije tehnike i tehnologije, porasta životnog standarda i evolucije životnog stila, konstantna je opasnost da kao potrošači, „upadnemo u obrazac“ koji je, dugoročno gledano, destruktivan za životnu sredinu i koji izaziva još čitav niz ekoloških ali i socijalnih problema. Envaermentalisti navode kao tri najčešća činioca zagađenja životne sredine: *stanovništvo, tehnologiju i potrošnju*. Potrošnja je, kako navode, faktor kome se pridaje najmanje važnosti a zapravo ima dominantan uticaj. Odabir i potrošnja dobara predstavlja refleksiju i funkciju naše kulture, odnosno, šire definisano: našeg mentaliteta. Mentalitet je vrlo kompleksan pojam. U načelu, potrošački mentalitet je smišljena ideologija koja se rodila u Sjedinjenim Američkim Državama a zatim se tendenciozno proširila na ceo svet jer je trebalo razviti potrošačima želju da što više i zarađuju i troše, nametnuti novi sistem vrednosti i „obavezan trend“ raskoši. S obzirom da su i mentalitet i kultura dinamičke i promenljive kategorije, u literaturi se, kroz uvođenje holističkog marketinga, uticalo na promenu navika potrošača i na razvoj trenda zadovoljavanja potreba i želja na način koji uključuje društveno odgovorne postupke, uvažavanje širih interesa kroz etički kontekst i razvoj ekološke svesti. Ekološka svest je oblik društvene svesti i istorijska kategorija koja nastaje u konkretnim društveno-istorijskim uslovima, kada je došlo do narušavanja ekološke ravnoteže, odnosno do ekološke krize. Ekološka svest, dakle, predstavlja osnovu rešavanja ekološke krize kroz svoje elemente a to su: ekološko znanje, ekološko ponašanje i vrednovanje ekološke situacije.

Кључне речи: *еколошка свест, потрошачки менталитет, друштвено-одговорно понашање*

UVOD

Tema rada „Potrošački mentalitet kao faktor razvoja ekološke svesti“ je veoma aktuelna i značajna s obzirom na činjenicu da ekološka svest predstavlja osnovu rešavanja ekološke krize a da je mentalitet uopšte, a posebno potrošački, dominantan faktor razvoja ekološke svesti.

Cilj istraživanja je da se na osnovu postojećih sekundarnih podataka ukaže na negativan uticaj urbanizacije potrošača po zloupotrebu resursa, zatim da se kroz **teorijsko metodološki okvir** dođe do saznanja kako razvoj tehnologije, osavremenjavanje i modernizacija svih aspekata života i porast životnog standarda dovode do ekološke krize, kao i na koji način se može uticati na društveno odgovorno ponašanje.

Predmet je usklađen sa ciljevima.

POTROŠAČKI MENTALITET

Mentalitet je veoma kompleksan i sveobuhvatan pojam. Formira se pod snažnim uticajem velikog broja faktora među kojima je kultura jedan od najdominantnijih.

Potrošački mentalitet se može smatrati samo jednim delom mentaliteta uopšte i definiše se kao smišljena ideologija koja se rodila u Sjedinjenim Američkim Državama a zatim se tendenciozno proširila na ceo svet, jer je trebalo razviti kod potrošača želju da što više zarađuju i troše, nametnuti im novi sistem vrednosti i „obavezan trend“ raskoši. (Vujović, 2009.) Mentalitet uopšte, potrošački mentalitet, pa čak i kultura spadaju u promenljive kategorije. Veliki uticaj na njihove promene ima i teorijski doprinos, a pre svega doprinos iz literature holističkog marketinga.

Relacija mentaliteta i potrošačkih navika

Odabir i potrošnja dobara spadaju u potrošačke navike i predstavljaju rezultat potrošačkog mentaliteta, odnosno, šire definisano: naše kulture i mentaliteta uopšte. Kao što je već rečeno, u literaturi se, kroz uvođenje holističkog marketinga, uticalo na promenu navika potrošača i na razvoj trenda zadovoljavanja potreba i želja na način koji uključuje društveno odgovorne postupke, uvažavanje širih interesa kroz etički kontekst i razvoj ekološke svesti.

Ekološka svest

Kao što je mentalitet deo kulture, tako je i ekološka svest deo ekološke kulture. Ona obuhvata stečena znanja i navike, usvojene vrednosti, stavove, uverenja i norme o tome šta je u prirodnoj i društvenoj sredini zdravo i kvalitetno, a šta nije. Ekološka svest ukazuje na koji način se u postojećim uslovima može zaista poboljšati kvalitet života ljudi (Šušnjić, 1998). Na formiranje ekološke svesti čoveka, pored mentaliteta i potrošačkog mentaliteta deluje još čitav niz faktora kao što su vaspitanje i obrazovanje, naučna dostignuća i praktična aktivnost na otklanjanju nepovoljnih ekoloških situacija itd. Ekološko vaspitanje i obrazovanje se nikako ne bi niti smelo niti moglo tretirati i tumačiti kao neka vrsta „nadogradnje“ nad obrazovanjem uopšte, već se mora shvatiti isključivo kao deo obrazovanja koje je neophodno savremenom čoveku, odnosno, koje znači inkorporiranje ekoloških aspekata u sistem obrazovanja uopšte. Ekološka svest je oblik društvene svesti i istorijska kategorija koja nastaje u konkretnim društveno-istorijskim uslovima, kada je došlo do narušavanja ekološke ravnoteže, odnosno do ekološke krize. Ekološka svest, dakle, predstavlja osnovu rešavanja ekološke krize kroz svoje elemente a to su: *1. ekološko znanje, 2. ekološko ponašanje i 3. vrednovanje ekološke situacije.* (Milešević Tanja, 2016.). Elementi ekološke svesti su i znanja o uzrocima i pojavnim oblicima narušavanja ekološke ravnoteže i mogućnostima delovanja na njih.

Ekološko znanje predstavlja saznanje o ograničenosti prirodnih resursa kao i o potrebi uspostavljanja novog sistema vrednosti između prirodnih i društvenih sistema, o uzrocima i posledicama narušavanja ekološke ravnoteže i potrebi utvrđivanja nove globalne strategije društvenog razvoja.

Vrednovanje ekološke situacije je određeno sistemom vrednosti društva, odnosno konkretne društvene grupe u kojoj se razvija društvena svest. U življenju i ponašanju u životnoj sredini uvek ima i neekoloških momenata što negativno utiče na okolinu ali i na dalji razvoj ekološke svesti. Naime, treba se osposobljavati za opažanje ugroženosti životne sredine. Sposobnost vrednovanja ekološke situacije zavisi od znanja, iskustva i kognitivnih sposobnosti. Treba se osposobljavati i da se kritički procenjuje sastav životne sredine u konkretnim slučajevima, da se vrednuju postupci drugih prema životnoj sredini, da se shvataju i primenjuju zahtevi ekološki odgovornog ponašanja prema svim elementima životne sredine.

Ekološko ponašanje je treći bitan element ekološke svesti i predstavlja angažovanje u konkretnim uslovima i situacijama. Ono je uslovljeno i osobinama konkretne ličnosti. Ekološka svest doprinosi koncipiranju i ostvarivanju ekološke politike. Sa razvojem ekoloških navika smanjuje se potreba za represivnim merama kao i za delovanjem administrativnim putem, kroz normativna i zakonska akta. Na ekološku svest i ekološke navike utiču i individualno i kolektivno iskustvo ljudi.

Za razvoj **ekološke krize** se ne mogu smatrati isključivim krivcima industrija, nauka i politika, već je neophodno da se celokupna društvena svest stavi pod lupu kritike. Veoma je izražena i čvrsta povezanost ekološke krize i krize savremenog društva uopšte. Ne treba svu dosadašnju civilizacijsko - društvenu i tehničku tradiciju odbaciti kao krajnje neprijateljsku, već je reč o nužnosti menjanja ustaljenog odnosa prema prirodi koju ima čovek uopšte, a posebno odnos čoveka kao potrošača. (Vasović, 2006.)

“Dobrovoljno robovanje savremenoj potrošnji, diktatu tržišta, kako govori Markuze, načinilo je od modernog čoveka roba zavisnog od gospodara masovne proizvodnje i stvorilo je od društva - zajednicu konformista nesposobnu da se kritički odnosi prema diskutabilnoj stvarnosti”(Vasović, 2006.).

ODRŽIVI RAZVOJ

Koncepciju održivog ili uravnoteženog razvoja ne bi trebalo shvatiti kao strogo određenu definiciju, već kao proces promena u odnosima koji se uspostavljaju između društvenih, ekonomskih i prirodnih sistema.

Ne postoji jedinstvena i opšteprihvaćena definicija pojma održivog razvoja. Jedna od najčešćih definicija glasi: „Održivi razvoj jeste razvoj koji zadovoljava potrebe sadašnjice, a da ne dovodi u pitanje sposobnost budućih generacija da zadovolje vlastite potrebe“. Takođe, održivi razvoj predstavlja integralni ekonomski, tehnološki, socijalni i kulturni razvoj, usklađen sa potrebama zaštite i unapređenja životne sredine, koji omogućava sadašnjim i budućim generacijama zadovoljavanje njihovih potreba i poboljšanje kvaliteta života na našoj planeti“(Rajković, 2020.).

STRATEGIJE ODRŽIVOG RAZVOJA

Kao teorijski doprinosi sprečavanju nastajanja, ali i korigovanju ovih problema se pre svega navode Strategije održivog razvoja. Za nas su, konkretno, najinteresantnije: *Strategija održivog razvoja EU i Strategija održivog razvoja RS.*

Strategija: «Evropa 2020» fokusirana je na tri međusobno povezana prioriteta: **1) pametan rast, 2) održivi rast, (najvažniji aspekt za ovaj rad), i 3) inkluzivni rast.** (dostupno na: <https://www.mpn.gov.rs/wp-content/uploads/2015/08/EU-2020.pdf>, *Evropski pokret Srbija, Fond za otvoreno društvo, Srbija Vodič kroz strategiju Evropa 2020: Opšti pregled - Put od Lisabonske strategije do strategije Evropa 2020.*)

1. Pametan rast - obuhvata razvoj ekonomije zasnovane na znanju i inovacijama (naučno tehnološka istraživanja i razvoj, inovacije, obrazovanje i digitalno društvo). Zadaci su: smanjiti stopu ranog napuštanja škole na ispod 10% sa trenutnih 15%, uz istovremeno povećanje procenta stanovništva sa diplomom visokoškolske ustanove sa 31% na 40%. A takođe i smanjiti broj ljudi koji žive ispod linije siromaštva za 25%, što će predstavljati izlazak preko 20 miliona ljudi iz siromaštva.

2. Održivi rast - istovremeno podstiče konkurentnost i proizvodnju koja se efikasnije odnosi prema resursima. Jedan od imperativa je ostvariti i tzv. „20/20/20“ klimatsko-energetski cilj, tj. 20% smanjenja emisije gasova koji izazivaju efekat staklene bašte u odnosu na 1990. godinu, (ili čak za 30% ako dozvole uslovi), 20% povećanja udela obnovljivih izvora energije u finalnoj potrošnji i za 20% povećanje energetske efikasnosti.

3. Inkluzivni rast – znači bolju participaciju na tržištu rada, borbu protiv siromaštva i socijalnu koheziju. Treba dodati i kratkoročni prioritet – izlazak iz krize.

Sve ovo postaje daleko jasnije ako se sagledaju načini manifestovanja ekološke krize kroz raličite stepene razvijenosti pojedinih zemalja. Dok su razvijenije zemlje više suočene sa problemom iscrpljenosti i zagađenja resursa, trendom razvoja psihičkih i imunoloških oboljenja i opadanjem kvaliteta života uopšte, dotle je nerazvijeni deo Zemlje izložen problemima demografskog buma, siromaštva i loših uslova života u daleko većoj meri nego sa problemima zagađenja.

- Kad je u pitanju *Strategija održivog razvoja Republike Srbije*, treba istaći da je najvažniji cilj Nacionalne strategije da uravnoteži tri stuba održivog razvoja: (dostupno na: <https://www.mpn.gov.rs/wp-content/uploads/2015/08/EU-2020.pdf>, *Evropski pokret Srbija, Fond za otvoreno društvo, Srbija Vodič kroz strategiju Evropa 2020*):
 - održivi razvoj ekonomije, privrede i tehnologije,
 - održivi razvoj društva na bazi socijalne ravnoteže i
 - zaštitu životne sredine uz racionalno raspolaganje prirodnim resursima.

Kako Marković navodi, (Marković, 1991.), svi ti naponi za zaštitu životne sredine i za postizanje održivog razvoja, postavljaju temelje potpuno novoj naučnoj disciplini: ekologiji, a time i formiranju, jačanju i razvoju ekološke svesti. Takođe je bitno istaći da razvoj ekonomije zasnovane na znanju ne podrazumeva samo udžbeničko znanje već skup veština, sposobnosti i kompetencija kojima se stvaraju inovacije i rešavaju problemi.

Cilj svih reformi koje se sprovode u Republici Srbiji od početka demokratizacije 2000. godine jeste stvaranje otvorene tržišne privrede u kojoj se stavlja akcenat na razvoj proizvoda za održivi razvoj koji uključuje i dizajn za životni ciklus (Life Cycle Design – LCD) koji se zasniva na ideji da se materijali transformišu iz jednog oblika korišćenja u drugi, pri čemu se ta transformacija odvija bez kraja, na opštu korist.

Održivi dizajn proizvoda je relativno nova disciplina, koja uključuje ekonomske imperativne, etiku i druge društveno-ekonomske dimenzije održivosti, a koristi ekološke principe kao metode projektovanja, čime se postižu ciljevi održivosti u sledećim oblastima: zaštita životne sredine, ciljevi u ekonomiji i posebno ciljevi društva. Idealan proizvod je onaj koji maksimizira sve tri oblasti, što znači da je dobar za životnu sredinu, da je profitabilan za kompaniju i da poboljšava društvo.

Dok je ekonomsku održivost relativno lako izmeriti i kvantifikovati, dotle je socijalnu održivost teže izmeriti zbog nematerijalne prirode i subjektivnosti u pogledu mnogih faktora koji se smatraju korisnim za društvo. Održivost životne sredine, sa gledišta proizvoda, takođe je teško kvantifikovati, tj. da bi se utvrdio uticaj proizvoda mora se analizirati ceo životni ciklus proizvoda, a to može biti prilično složen poduhvat. Ovo je dovelo do razvoja raznih alata i metodologija za merenje i analizu.

Principi razvoja proizvoda za održivi razvoj su takođe mnogobrojni, a među značajnijima su da:

- Treba koristiti netoksične osnovne ili reciklirane materijale koji imaju manji negativni uticaj na životnu sredinu od tradicionalnih materijala;
- Treba koristiti proizvodne procese i proizvode koji su energetski efikasniji od tradicionalnih procesa i krajnjih proizvoda;
- Treba proizvoditi trajnije i pouzdanije proizvode koji će ređe morati da budu zamenjeni;
- Treba razvijati proizvode za ponovnu upotrebu i reciklažu. Proizvodi treba da se lako rastavljaju tako da se delovi mogu ponovo koristiti za pravljenje novih proizvoda;
- Treba koristiti standarde za održivi razvoj i dr. (npr. dizajn za životnu sredinu);
- Treba uzeti u obzir životni ciklus proizvoda tj. koristiti alate za analizu životnog ciklusa kako bi se razvili održiviji proizvodi;
- Materijali treba da dolaze iz održivo obnovljivih izvora koji mogu da se kompostiraju kada je iscrpljena njihova korisnost. (Dostupno na: <http://www.sustainable-energybih.org/res-2/hpp>)

ZAKLJUČAK

Potrošački mentalitet koji karakteriše visoka stopa korišćenja resursa po stanovniku i visoka stopa zagađenja i narušavanja životne sredine, mora ustupiti mesto mentalitetu potrošača koji insistiraju na stvarnom povećanju kvaliteta života. Oni moraju prihvatiti novi stil života - da žive jednostavnije ali i kvalitetnije i da shvate da "kupovanje više potrošnih proizvoda i luksuznih artikala za zadovoljavanje veštački stvorenih želja ne doprinosi povećanju njihove bezbednosti, slobode ili radosti". (Milenović, B., 2000.). Promenu potrošačkog mentaliteta i jačanje ekološke svesti treba forsirati na svim društvenim nivoima, menjajući stil života, potrošačke navike, forsirati recikliranje i korišćenje reciklabilnih materijala i obnovljivih izvora energije, uticati na promenu stavova o zdravijem načinu života i korišćenju organskih proizvoda. Treba smanjiti forsiranje maksimiziranja profitabilnosti i okrenuti se društveno odgovornom ponašanju, jer se samo tako mogu izbeći ekološki krizne situacije i ekološka katastrofa.

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Development of Cryptocurrency

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Abstract

This paper deals with cryptocurrencies, their comparison (bitcoin and ethereum) and ways of their functioning. Cryptocurrency is a form of digital asset that is used as a medium of exchange using cryptography as a way to ensure the security of transactions, control the creation of additional monetary units and to confirm the transfer of currency. Bitcoin is a "peer-to-peer electronic cash system" that is completely decentralized - no servers involved and no central controlling authority. In a decentralized network, a blockchain is used in which every participant is included. Blockchain technology implies the existence of a public register of every transaction that has ever taken place within the network and is accessible to all participants. The result is that everyone in the network can see the balance of each account. The Ethereum digital currency is part of the Ethereum network protocol, the technology of which is more advanced compared to blockchain platforms. The principles of mining these two cryptocurrencies are completely different. For bitcoin mining, the so-called ASIC devices (mining through a processor), and graphics cards are used for ethereum mining, which implies that ethereum mining does not require large investments like bitcoin mining.

The environmental impact of cryptocurrency mining is significant, as huge amounts of electricity and hardware are consumed. In this sense, the Ethereum Foundation announced the transition from proof-of-work to proof-of-stake, where participants in the network are not miners but validators, and the energy savings would be huge because only the computer that would perform the calculations would consume electricity. Cryptocurrency is currently outside the influence of EU legislation, as there are no regulations and user protection. This could lead to financial instability, market manipulation and financial crime.

Keywords: cryptocurrency, bitcoin, ethereum, blockchain, mining.

1. Introduction

Paper money has advantages in exchange because two people can make the exchange without the involvement of a third party. Those persons remain anonymous, which is a great advantage of paper money, i.e. clearly established property legal value is without central authority. In today's era of internet transactions, there is a loss of anonymity because a third party must be involved in the trade exchange, ie. the bank. In such systems, technical errors and misuse can occur. That's why there was a need for a new decentralized currency - a virtual currency. In such systems, there is no third party, which means that there are no additional costs and opportunities for fraud. Also, another advantage is anonymity. This kind of system is the subject of this paper.

Cryptocurrency is a form of digital asset that is used as a medium of exchange using cryptography as a way to ensure the security of transactions, control the creation of additional monetary units and confirm the transfer of currency.

In this paper, cryptocurrencies will be presented with special reference to Bitcoin and Ethereum. Also, the advantages and disadvantages of cryptocurrencies will be described, whether it is currently profitable to invest in mining hardware and how cryptocurrencies will affect the world today and in the future.

The beginning of the work is dedicated to explaining what cryptocurrencies are and an account of their development throughout history. The second chapter deals with the comparison of the most important cryptocurrencies - bitcoin and ethereum. Below is the concept of mining. The current situation in the world of cryptocurrencies and some future expectations are given in the end.

2. History of cryptocurrency

In the 1990s, there were many unsuccessful attempts to create a digital currency. Companies (Flooz¹ and Beenz²) provided online currency that could be used to get rewards or make purchases online. The reason for their failure was various types of fraud, financial problems and even conflicts between employees.

In early 2009, an anonymous developer or group of developers under the pseudonym Satoshi Nakamoto introduced Bitcoin. Satoshi described it as a "peer-to-peer electronic cash system" (Nakamoto, S. 2008). The presented system was completely decentralized - no servers involved and no central controlling authority, similar in concept to peer-to-peer file sharing networks.

Unlike traditional banking, cryptoassets have no need for a central registry. It is a digital asset that can be used as a medium of exchange or for various types of investments, and it is based on decentralized transaction record keeping technology, which enables secure recording of transactions through a network of computers.

Blockchain is used in the decentralized network, in which every participant is included. Blockchain technology implies the existence of a public register of every transaction that has ever taken place within the network and it is accessible to all participants. The result is that everyone in the network can see the balance of each account (Cretarola. A. at al. 2021).

Each transaction is a file consisting of the public keys of the sender and receiver (wallet addresses) and the amount of money transferred. The transaction must also be signed by the sender with their private key. All this is just basic cryptography. Finally, the transaction is confirmed and broadcast in the network. Transaction confirmation can only be done by miners solving a cryptographic puzzle. They download transactions, mark them as legitimate, and spread them across the network. After that, each node adds them to its database. Once the transaction is verified, it becomes irreparable and irreversible, and the miner receives the reward, plus transaction fees³.

Since the transactions are private, they are not processed or guaranteed by any central bank or any public body, i.e. institution. However, the term "crypto" in the name suggests security, since it is about protection with cryptography.

In 2012, the European Central Bank divided cryptocurrencies into three groups.

The first group consists of currencies with one-way movement and as such are used for the purchase of virtual goods, but it is also possible to purchase some material goods.

The second group has value only in the virtual world and cannot be redeemed outside of it, such as buying video games. Once money has been paid to the seller's account, the funds cannot be returned.

The third group consists of two-way currencies. Once purchased as such, they can be sold and recouped. This group includes the following cryptocurrencies: Bitcoin, Ethereum and others.

The first bitcoin transactions were made in 2010. At that time, Bitcoin did not attract public attention until 2013, when it reached a high of \$212, but also the biggest drop that happened due to hackers who appropriated a large amount of money.

Also, the problem with cryptocurrencies is represented by countries that prohibit their use, such as China. Their cryptocurrency regulations and massive heist in January 2017 led to the collapse of the crypto market.

In addition to bitcoin, one of the most important cryptocurrencies is ethereum. Its creator is Vitalik Buterin, who previously worked on the development of decentralized applications for Bitcoin. This digital currency is part of the Ethereum network protocol whose technology is more advanced compared to blockchain platforms.

It first appeared in 2015, and it is currently the second most valuable digital currency after Bitcoin. Ethereum is envisioned as a currency that will strengthen Bitcoin. Proponents of this currency argue that it has certain advantages over Bitcoin that may make it more useful. Namely, ethereum allows so-called "blocks", proofs of cryptocurrency transactions, to be created much faster than with bitcoin, because of the check, admirers of this currency believe that ethereum would be far more efficient in online commerce.

3. Comparison of cryptocurrencies

A comparison of the two most famous and currently most widespread cryptocurrencies, Bitcoin and Ethereum, will be shown below. There are a lot of similarities and differences as both are blockchain-based decentralized entities (Gowda. N. at al., 2021). These cryptocurrencies are also used outside of their ecosystem, such as in crypto exchanges.

¹ <https://docs.flooz.trade/>

² <https://en.wikipedia.org/wiki/Beenz.com>

³ <https://sr.m.wikipedia.org/sr-ec/Криптовалута>

3.1 The purpose: Bitcoin was introduced at the end of 2008 by the mysterious founder Satoshi Nakamoto, right at the time of the great financial crisis. The purpose of such a system was and remains to establish a global decentralized financial system, but at the same time to give users the opportunity to have control over their finances.

Ethereum, on the other hand, was not made just to serve as a means of payment but has a much broader purpose. It is designed so that developers can create applications with the help of blockchain technology through smart contracts. A smart contract is actually computer code that has rules that users must follow. The advantage of this principle is that users communicate directly with each other without any need for an intermediary.

Unlike Bitcoin, Ethereum is an unlimited supply of cryptocurrencies⁴. This means that cryptocurrency can be in a state of inflation.

3.2 The maximum value of these cryptocurrencies: Bitcoin has been on the market for much longer than ethereum, so it is more widespread and well-known. Bitcoin reached its maximum value of over \$68,000 in November 2021⁵. In the same period, Ethereum reached a value of over \$4,300⁶. In June 2022⁷, their values were:

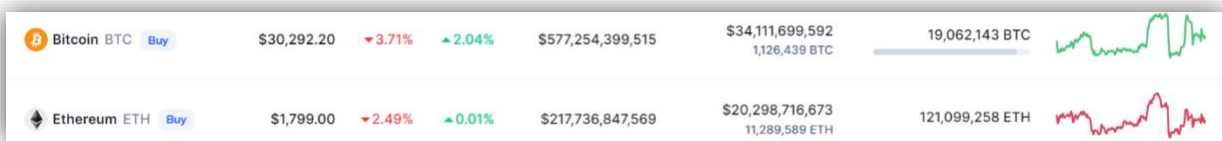


Figure 1. Bitcoin and Ethereum Values (June 2022)

3.3 The principle of mining

In Bitcoin, mining means adding new blocks to the blockchain. Bitcoin mining requires a lot of computing power to solve a cryptographic problem. One of the best hardware used for mining is the Bitmain AntMiner S5. It is characterized by low consumption of electricity in relation to efficiency because it generates 1Gh/s for every 0.51W of electricity consumed. The first Bitcoin miner to solve the puzzle receives a block reward of a certain number of Bitcoin coins. Because a lot of computing power is required, miners are often grouped into mining pools to share resources and block rewards. Then the block is confirmed and added to the blockchain. This information is sent to all nodes.

Ethereum cannot be mined by ASIC mining machines due to Ethereum's operating protocol. Ethereum mining does not require large investments like Bitcoin mining. It is possible to mine Ethereum on any average computer with a discrete graphics card. It still works on acquiring proof of work (Proof of Work or PoW). It is actually using computing power to solve mathematical problems. Numerous computers compete to simultaneously process cryptographically secure transactions, and only one obtains the PoW. More precisely, the first miner to solve the math problem broadcasts to the entire network that the block has been mined, then other blocks check it and add it to the blockchain.

3.4 Transaction fees: Fees for bitcoin transactions are measured in satoshi units where the value of 10,000 satoshis is equal to 0.0001 bitcoin. Users, on the one hand, tend to pay as little as possible for transactions, while miners, on the other hand, tend to have as much compensation as possible. The total transaction fee per byte is 40 satoshis or 0.0004 bitcoins per kilobyte, and each block can hold around a million bytes. Regardless of the number of bitcoins a user wants to transfer through the network, for each transaction of 250 bytes they will pay the same fee.

The smallest unit of Ethereum is called a wei. It takes a large amount of wei to make ether. 10⁹ more makes gwei (eng. gwei). Gwei is most often used when talking about gas (a compensation for network transactions). So for example, the gas price of 0.000000001 ether is 1 gwei.

So on the ethereum blockchain, gas refers to the cost of transactions through the network which measures the work being done, but has no monetary value. The price of gas is determined by the miners and they can reject the transaction if the value is less than their requirements.

⁴ <https://comparebrokers.co/compare/trading-ethereum/>

⁵ <https://time.com/nextadvisor/investing/cryptocurrency/bitcoin-price-history/>

⁶ <https://www.statista.com/statistics/806453/price-of-ethereum/>

⁷ <https://coinmarketcap.com/>

4. Ethereum mining

Unlike Bitcoin, which is mined through processors, Ethereum is mined through graphics cards. When mining, it is necessary to take into account the profitability, the duration of mining of a specific currency, the price of components, the possibility of purchasing components, the compatibility of equipment and the like.

4.1 Hardware: The cost of components is a significant item in mining. This primarily refers to the graphics card. Research has determined that the Rx580 graphics card with 8Gb performed best in terms of price-quality ratio. Its price is around €330.

Another component that is very important is the power supply. It must be of good quality to avoid overloading. There are titanium, platinum, gold and bronze power supplies. Since titanium power supplies are too expensive, it is best to opt for gold quality, which is often half the price of titanium. With the power supply, you should also pay attention to how many outputs there are for the GPU and whether it has serial, SATA connectors. An example of a good gold standard power supply is the EVGA750GQ which supports up to 8 graphics cards and has SATA connectors with a price of around €70.

The next component is the motherboard. It must have as many PCI slots as possible. Many motherboards are made specifically for mining, but when choosing, it is wiser to buy one that can be used even if mining becomes unprofitable. One of the better solutions is the ASUS Z270A prime. The price of this motherboard is around €100.

Other components include the processor, USB riser, RAM, SSD and monitor. USB risers connect graphics cards to the motherboard. The strength of the processor is not crucial, so even a weaker processor can do the planned work. It is recommended that the RAM memory be at least 8GB.

4.2 Software: When we talk about the software used in mining, we should start with the operating system. It can be Windows or Linux, with a note that you should turn off the possibility of updating, which can lead to a restart of the computer and thus to the interruption of the mining process. It is recommended that the operating system works in offline mode without an account or password.

In addition to the operating system, it is necessary to install the driver for graphics cards and execute the so-called BIOS modding ie. increasing the working clock of graphic cards.

When increasing the working clock, it is important to put additional fans on the mining machine for better cooling of the graphics cards. In addition to system programs, the software used for mining should be mentioned. An example is Clymore (Claymore's Dual Ethereum AMD+NVIDIA GPU Miner).

One of the most important items is the wallet to which funds will be transferred during mining. Myetherwallet, which is made by the same company, can be used for ethereum mining⁸. As the basic purpose of crypto-currencies is to replace real money with virtual, this has led to the development of e-exchanges. Among the more famous are:

- Binance - <https://www.binance.com/en>.
- Coinbase - <https://www.coinbase.com/>
- Coinmama - <https://www.coinmama.com/>
- CEX - <https://cex.io/>.

5. Cryptocurrencies today and in the future

Until just a few months ago, cryptocurrencies were booming and promising a bright future. At the end of 2021, one bitcoin was worth just under \$70,000, but things have changed since then.

During the rise of cryptocurrencies in recent years, the number of companies "trading" digital assets has grown exponentially. Many who understood what bitcoin, or some other cryptocurrencies are, managed to get rich quickly and invest in some of their businesses⁹.

However, the total value of the cryptocurrency market has fallen by 65% since the fall, and analysts predict further declines. The sharp decline of the crypto market only illustrates the uncertainty of the ecosystem built around this risky and unregulated asset.

Cryptocurrency is currently outside the influence of EU legislation¹⁰, which creates significant risks, as there is a lack of regulation and user protection. These risks apply not only to consumers but also to companies and the financial market.

Citizens of the European Union, as well as Serbia, cannot currently count on any consumer protection rules and are often not well informed about the risks, which could mean that a large number of people could easily and suddenly run out of money. The widespread

⁸ <https://www.myetherwallet.com/>

⁹ [https://smartlife.mondo.rs/biznis/kriptoalute/a50971/Propast-kriptoaluta-i-najniza-Bitcoin-vrednost-od-2020-godine.html](https://smartlife.mondo.rs/biznis/kriptovalute/a50971/Propast-kriptoaluta-i-najniza-Bitcoin-vrednost-od-2020-godine.html)

¹⁰ <https://smartlife.mondo.rs/biznis/kriptoalute/a50970/Problemi-kriptoaluta-i-nesigurnost-trzista.html>

use of cryptocurrency without any regulation could lead to financial instability, market manipulation and financial crime (Trozze. A. at al. 2022).

However, the Law on Digital Assets is already applied in Serbia¹¹, unlike the EU, which still does not have a single legal act on it.

The impact of cryptocurrencies on the environment is also significant, because the technology of mining or creating virtual money consumes huge amounts of electricity, as well as hardware that wears out quickly and requires frequent replacements. In this sense, ethereum announces the transition to a non-mining protocol, and the electricity consumption itself could drop by as much as 99.95%. Namely, the foundation behind this cryptocurrency announced the transition from proof-of-work to proof-of-stake (Ethereum 2.0) last year.

Under the new PoS (Proof of Stake or PoS) system, participants in the network are not miners but validators, who randomly get the opportunity to process individual transactions. The chance of the opportunity increases based on the amount of stakes of own ether that serves as a guarantee of well done job. Since in such a system electricity is consumed only by the computer that performs the calculations, the energy savings would be enormous.

Unfortunately, since most cryptocurrencies won't be PoS anytime soon (if ever), it's logical to assume that miners will be mining some other cryptocurrencies, primarily Bitcoin. Also, the question arises whether this transition will affect the demand and the drop in prices of graphics cards in the time to come.

6. Conclusions

According to the Law on Digital Assets of the Republic of Serbia, virtual currency is defined as "a type of digital asset that was not issued and the value of which is not guaranteed by the central bank or other public authority, which is not necessarily tied to legal tender and does not have the legal status of money or currency, but it is accepted by natural or legal persons as a means of exchange and can be bought, sold, exchanged, transferred and stored electronically".

This paper describes cryptocurrencies and compares the two most used, Bitcoin and Ethereum.

Bitcoin was introduced in late 2008 by founder Satoshi Nakamoto. The purpose of such a system was and remains to establish a global decentralized financial system, but at the same time to give users the opportunity to have control over their finances.

Ethereum does not only serve as a means of payment but has a much wider purpose. It is designed so that developers can create applications with the help of blockchain technology through smart contracts. A smart contract is actually computer code that has rules that users must follow. The advantage of this principle is that users communicate directly with each other without any need for an intermediary.

The analysis showed that mining bitcoin, which has over 10 times the value of ethereum, requires significantly more demanding hardware, which entails much higher electricity costs. Ethereum is trying to minimize the negative impact of cryptocurrency mining on the environment by moving from proof-of-work to proof-of-stake system, in which electricity is consumed only by the computer that performs the calculations, which would result in huge energy savings.

In recent months, we have seen a dizzying decline in cryptocurrencies. One of the reasons is their safety, which is reflected in the lack of legal regulations and user protection. Cryptocurrency is currently outside the influence of EU legislation, so it is believed that one of the first steps in overcoming this crisis would be in its legal regulation.

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¹¹ <https://www.paragraf.rs/propisi/zakon-o-digitalnoj-imovini.html>

Application of Fibonacci Sequence in Making Investment Decisions on the Stock Exchange

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Abstract

While developing the Elliott Wave theory and conducting an analysis of the mathematical properties of waves and patterns, Ralph Nelson Elliott saw that the model reflects the Fibonacci sequence, that cumulative Fibonacci sequence is the basis of the wave principle. Fibonacci retracement is a method of technical analysis that determines support and resistance levels. At the core of the concept is the idea that markets will retrace a predictable portion of their movement, after which they will continue to move in their original move. The paper will look at the relationship between the Elliott Wave theory and the Fibonacci retracement. The aim of the paper is to show traders the possibility of using Fibonacci retracement lines and the possibility of predicting potential turning points where support or resistance will be encountered. If retracements are based on a bullish trend, the retracement should indicate potential support levels where the downtrend will reverse to bullish. If the retracements are based on a bear trend, the retracement should indicate potential resistance levels where the bounce will reverse to the downside. Generally, retracement lines can be considered stronger support and resistance levels when they coincide with a key moving average such as the 50- or 200-day simple moving average. In the practical part of the paper, the application of the Fibonacci retracement in the situation of rising (Bull) and falling (Bear) trends will be pointed out.

Keywords: technical analysis, Elliott Wave theory, Fibonacci retracement, stock trading, stock market

Примена Фибоначијевих Низова у Доношењу Инвестиционих Одлука на Берзи

Борјана Б. Мирјанић, Душица З. Карић

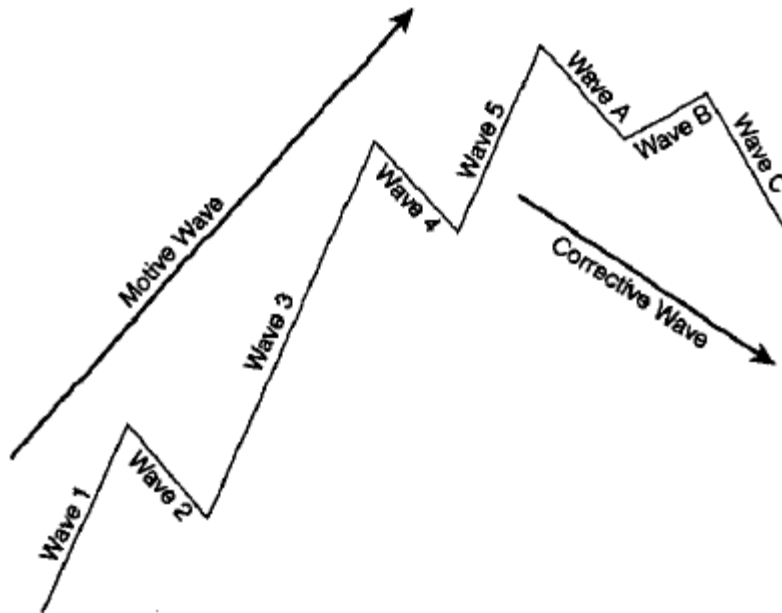
АПСТРАКТ

Приликом дефинисања Elliott Wave теорије и спровођења анализе математичких карактеристика таласа и образаца, Ralph Nelson Elliott је установио да модел одражава Фибоначијев низ (Fibonacci sequence), односно да је Фибоначијеви збирни низ основа принципа таласа. Фибоначијево повлачење (Retracement) представља методу техничке анализе којом се одређују нивои подршке (Support) и отпора (Resistance). У основи концепта је идеја да ће тржишта поново пратити предвидиви, конзистентан део свог кретања, након чега ће наставити да се крећу у првобитном правцу. У раду ће се сагледати однос Elliott Wave теорије и Фибоначијевог повлачења. Циљ рада је да се трејдерима укаже на могућности коришћења Фибоначијевих линија повлачења и могућности предвиђања потенцијалних тачака преокрета у којима ће се наићи на подршку или отпор. Ако су повлачења заснована на биковском кретању (Bull trend), повлачења би требало да укажу на потенцијалне нивое подршке где ће се силазни тренд преокренути на биковски. Ако су повлачења заснована на медведском кретању (Bear trend), повлачења би требало да укажу на потенцијалне нивое отпора где ће се одскок преокренути у опадајућем смеру. Генерално, линије повлачења се могу сматрати јачим нивоима подршке и отпора када се поклапају са кључним покретним просеком као што је 50- или 200-дневни једноставни покретни просек. У практичном делу рада указаће се на примену Фибоначијевог повлачења у ситуацији растућег (Bull) и опадајућег (Bear) тренда.

Кључне речи: техничка анализа, Elliott Wave теорија, Фибоначијево повлачење, берзанско трговање, берза.

1. Основни теоријски постулати Фибоначијевог повлачења (Retracement)

„Математика је алфабет којим је Бог написао Универзум” рекао је Галилео, и ова сентенца постаје потпуно смислена када се проучава Фибоначијев „код“, односно бројеви и односи изведени из овог низа бројева довољно дуго. Оно што је важно за већину трговаца је да примена ових односа може помоћи у идентификацији кључних зона подршке (Support) и отпора (Resistance) на тржишту, и стога одредити кључне могућности за трговање или подешавања. Тако је и приликом иницијалног развијања свог тржишног модела и спровођења анализе математичких карактеристика таласа и образаца, Ralph Nelson Elliott констатовао да модел одражава Фибоначијев низ, односно да је Фибоначијеви збирни низ основа принципа таласа (Elliott, 1994, стр. 70, 217, 194, 196), што је представљено на приказу 1. Бројеви из секвенце Фибоначијевог низа понављали су се у структури Elliott-ових таласа: импулсни таласи (1,3,5 – растући таласи), један пуни циклус (5 навише, 3 наниже = укупно 8 таласа), завршни (89 таласа) и корективни обрасци (55 таласа).



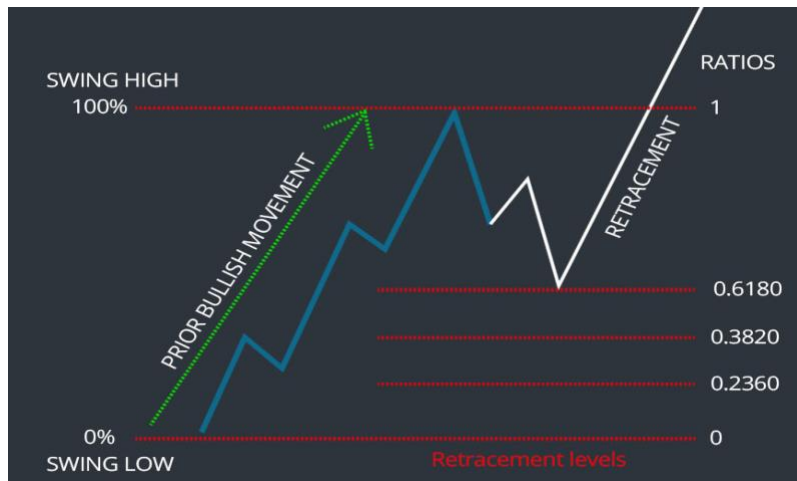
Приказ 1. Основни образац Elliott-овог таласа

Извор: Kirkpatrick, C. D, Dahlquist J. R, (2007). *Technical Analysis, The Complete Resource for Financial Market Technicians*, Financial Times Press, стр. 487.

На приказу 1. видимо да се један циклус састоји од 8 таласа: 5 растућих и 3 опадајућа. У растућем делу циклуса таласи су означени бројевима. Таласи 1, 3 и 5 - импулсни таласи су растући, док се таласи 2 и 4 крећу у супротном смеру од преовлађујућег тренда. Таласи 2 и 4 се називају корективни таласи јер исправљају кретање таласа 1 и 3. Након наведених 5 таласа, започиње корекција од 3 таласа, та три корективна таласа означена су словима А, В и С. Сваки талас се дели на мање таласе који се пак деле на још мање таласе, из чега произилази да је сваки мањи талас део већег таласа. Два највећа таласа (1 и 2) могу се поделити на 8 мањих таласа, који се пак могу поделити на 34 још мања таласа, а 34 мања таласа могу се поделити на 144 још мањих таласа. Бројеви које смо до сада приметили су: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 – нису случајни бројеви, већ део Фибоначијевог низа који је математички темељ Elliott-ове теорије таласа. (Murphy, стр. 296-297). Фибоначијев низ је компатибилан са златним пресеком (1,618).

Стога је циљ рада да се приказе примена Фибоначијевог повлачења у пракси техничке анализе и трејдинга, као и Фибоначијева рација и повезани рацио односи приликом одређивања нивоа подршке (Support) и отпора (Resistance) тржишних таласа. Другим речима, помоћу Фибоначијевог повлачења тредери су у могућности да утврде ценовне тачке које могу бити од помоћи приликом дефинисања параметара тренда (Douglas, 2001, стр. 8–10). Фибоначијево повлачење (Retracement) представља методу техничке анализе којом се утврђују нивои подршке (Support) и отпора (Resistance), у чијој је основи идеја да ће тржишта поново пратити предвидиви део свог кретања, након чега ће наставити да се крећу у првобитном правцу. Фибоначијево повлачење се креира тако што се одреде две екстремне тачке на графикону, након чега се врши дељење добијеног вертикалног растојања са кључним Фибоначијевим бројем, при чему се 0,0% сматра почетком повлачења, а 100,0% се сматра потпуним преокретом на оригинални део кретања. Једном када се ови нивои идентификују, повучене хоризонталне линије се користе за идентификацију потенцијалне подршке и нивоа отпора. Фибоначијево повлачење се покреће од претходног ниског ка високом замаху, применом рација: 0,382, 0,50, 0,618 и 0,786 (0,236 се такође користи у неким случајевима ако је замах релативно дуг) да се идентификују могући нивои подршке приликом повлачења тржишта са високим вредностима. Повлачење се такође покреће од претходног високог ка ниском замаху, тражећи могући отпор док се тржиште креће од ниског нивоа. Већина основних пакета техничке анализе покреће нивое повлачења када инвеститор одабере замах са којег жели да их покрене и изабере одговарајући Фибоначијев алат за цену у оквиру програма који користите. Најбоље је да се дужина замаха помножи (од ниског ка високом или од високог ка ниском) односом повлачења а и затим се одузме резултат од високог ако је присутан тренд од ниске до високе цене анализираних финансијских активних, или се додају резултате најнижем када је присутан тренд од високог ка ниском нивоа цена. (Voroden, стр. 9). Индикатор је назив добио јер користи Фибоначијев низ бројева који поседује следећа својства, а

уочио их је италијански математичар Leonardo Pisano¹: низ бројева почиње са 0 и 1 и креће се до бесконачности, а да би се извео наредни број у низу изводи се додавањем претходна два, на пример: $55 + 89 = 144$, $89 + 144 = 233$, $144 + 233 = 377$, итд. Фибоначијева серија бројева је: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987... до бесконачности. Оно што је посебно фасцинантно у овој серији бројева је присуство константе унутар серије како напредује ка бесконачности. Дељењем било ког броја у низу следећим бројем добија се 1,6180 – што представља златни пресек, док дељење било ког броја његовим претходником добија се 0,6180 (Boroden, стр. 1,2). Ако бисмо посматрали даље, видели бисмо да се дељењем било ког броја у низу бројем за два места унапред добија 0,3820, док се дељењем било ког броја бројем три позиције унапред добија 0,2360. Управо ови односи који потичу из Фибоначијевог низа могу се пронаћи у математици, архитектури, али и у природи.



Слика 1. Фибоначијев низ

Извор: <https://scanz.com/fibonacci-retracements-guide/>

Приликом анализе тржишта не користити се низ Фибоначијевих бројева, математички односи (рација) изведени из Фибоначијевог низа (на пример, 1,618 и 0,618 (Stevens, 2002)). Главни односи који се користе у анализи су 0,382, 0,236, 0,50, 0,618, 0,786, 1,00, 1,272 и 1,618): на пример: $1.0 - 0.618 = 0.382$; $0.618 \times 0.618 = 0.382$; $\frac{1}{2} = 0.5$, потом: квадратни корен од 0.618 је 0.786; број 0.618 је реципрочан броју 1.618; квадратни корен броја 1.618 је 1.272; $0.618 - 0.382 = 0.236$; $0.382 \times 0.618 = 0.236$; $1.618 \times 1.618 = 2.618$; $2.168 \times 1.618 = 4.236$ (Boroden, стр. 6)

Кључна Фибоначијева рација су: 0%, 23,6%, 38,2%, 50%, 61,8% и 100% (Brown, 2008).

$$F_{100\%} = \left(\frac{1+\sqrt{5}}{2}\right)^0 = 1 \quad (1)$$

¹ Leonardo Pisano, познат по надимку Фибоначи, рођен је 1170. у Пизи, Италија. Фибоначијев отац, Guilielmo Bonacci, био је јавни бележник и радио је за трговце. Фибоначи је путовао кроз северну Африку и Медитеран и у младости је био изложен математичким и рачуноводственим системима разних трговаца са којима је његов отац радио. У својим списима, Фибоначи се присећа учења математике и рачуноводства система Индије, Египта, Сирије, Грчке, Сицилије и Провансе. Написао је значајне текстове значајне за оживљавање древних математичких вештина. Копије његових књига *Liber abaci* (1202), *Practica geometriae* (1220), *Flos* (1225) и *Liber quadratorum* (1225) постоје и данас. Књига комерцијална аритметика, *Di minor guisa* је изгубљена. Фибоначијеви списи су заслужни за примену хинду-арапског децималног места и математичких симболе. Многи његови радови бавили су се ценама, проблемима са којима се суочавају трговци. Осмислио је анализу садашње вредности готовинских токова у уговорима и метод за изражавање приноса од улагања. Поред тога, решио је сложене проблеме каматних стопа (Goetzmann, 2003). Фибоначи је био светски највећи математичар свог времена. Иако је његов рад био основа децималног система, и поставио је темеље за финансијску математику, данас га нажалост памтимо искључиво за мали део његовог животног дела — његов нумерички низ. (Kirkpatrick, Dahlquist. стр. 501).

Фибоначијев однос од 0,618 се добија дељењем било ког броја у низу бројем који га одмах прати. На пример: 8/13 је приближно 0,6154, а 55/89 је приближно 0,6180.

$$F_{61.8\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-1} \approx 0.618034 \quad (2)$$

Однос 0,382 се добија тако што се било који број у низу подели бројем који се налази два места десно. На пример: 34/89 је приближно 0,3820.

$$F_{38.2\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-2} \approx 0.381966 \quad (3)$$

Однос 0,236 се добија тако што се било који број у низу подели бројем који је три места десно. За пример: 55/233 је приближно 0,2361.

$$F_{23.6\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-3} \approx 0.236068 \quad (4)$$

Однос 0 је:

$$F_{0\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-\infty} = 0 \quad (5)$$

Остали Фибоначијеви односи су: (Posamentier, Lehmann, 2007).

Однос 0,764 је резултат одузимања 0,236 од броја 1.

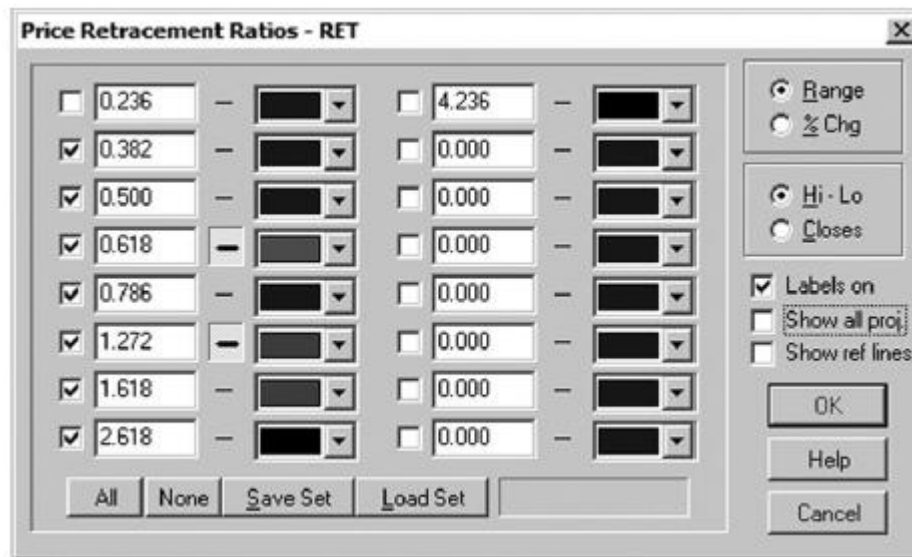
$$F_{76.4\%} = 1 - \left(\frac{1+\sqrt{5}}{2}\right)^{-3} \approx 0.763932 \quad (6)$$

Однос 0,786 је:

$$F_{78.6\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-\frac{1}{2}} \approx 0.786151 \quad (7)$$

Однос 0,500 се добија дељењем броја 1 (трећи број у низу) бројем 2 (четврти број у низу).

$$F_{50\%} = \frac{1}{2} = 0.500000 \quad (8)$$



Слика 2. Подешавање софтверског алата Фибоначијевог повлачења у пакету Dynamic Trader

Извор: Boroden, C. (2008). Fibonacci Trading: How to Master the Time and Price Advantage. McGraw Hill, стр. 10

На слици 2. приказано је подешавање опције Price Retracement/Ext у софтверу Dynamic Trader који се често користи за покретање следећег кретања цена. У оквиру за подешавање инвеститор мора да одабере омере које ће користити за покретање, повлачења цена и проширења цена. Исти алат се користи јер се оба повлачења и екстензије покрећу са две тачке на графикону - било високо на ниско или ниско на високо. Математички програм користи само ове две тачке, инвеститор користити исти алат за покретање проширења цена претходних замаха (Boroden, стр. 10) Када се дефинише подршка за корекцију, увек се почниће од врха и тек онда се бира ниска вредност. Прва одабрана тачка треба да буде

нула. Први прорачун у оквиру опсега испод нуле треба да буде вредност од 38,2 %, затим 50 % и 61,8 %. Најнижа цена изабрана на дну опсега је 100 %. Bloomberg-ови прорачуни су тачни, али TradeStation на пример, дефинише прву тачку изабрану као 100 и обрће редослед: однос од 38,2 % и 61,8 % падаће на исте нивое цена унутар распона! (Keller, стр. 72).

На слици 3, приказани су нивои повлачења (Retracement) за акције који су извучени на основу претходног медведског (Bear) или биковског (Bull) кретања. Да би нацртали нивое повлачења, потребно је да се уцрта линија тренда од најниже ка највишој у оквиру континуираног кретања цене – Фибоначијеве линије повлачења постављене су на 61,80%, 38,20% и 23,60% висине линије. У биковском кретању (Bull trend) линије повлачења почињу од врха кретања (тј. линија од 23,60% је најближа врху кретања), док се у медведском кретању (Bear trend) повлачења рачунају од дна кретања (тј. 23,60% линија је најближа дну покрета) (<https://scanz.com/fibonacci-retracements-guide/>).



Слика 2. Фибоначијеве линије повлачења
Извор: <https://scanz.com/fibonacci-retracements-guide/>



Слика 4. Фибоначијеви нивои повлачења за валутни пар USD/CAD

Извор: <http://en.wikipedia.org/w/index.php?title=File:Fibretracement.png>

На слици 4, приказане су вредности валутног пара америчког долара и канадског долара (USD/CAD) и уочава се враћање вредности на око 38,2% кретања наниже.



Слика 5. Пример односа Теорије Elliott- ових таласа и Фибоначија на валутном пару GBP/JPY

Извор: <https://es.expertooption.com/education/graphical-analysis/fibonacci-and-elliott-wave/>

Уколико бисмо сагледали однос Elliott Wave теорије и Фибоначија, графикон валутног пара британске фунте и јапанског јена (GBP/JPY) представљен сликом 4 је пример повратка четвртог таласа који се зауставља између 38,2% и 50,0% Фибоначијевог повлачења након завршеног трећег таласа. На слици 5. се примећује да принципи теорије Elliott-ових таласа добро функционише са другим елементима техничке анализе као претходна подршка (дно таласа-1) делује као отпор таласу 4. Таласни број приказан на графикону би био поништен ако се GBP/JPY помери изнад нивоа таласа 1.

2. Осврт на генезу идеје о примени Фибоначијевих рација у финансијама²

Batchelor-Ramyar (професор финансија Roi Batchelor и истраживач Richard Ramyar - бивши директор Друштва техничких аналитичара Велике Британије и шеф британског истраживања управљања имовином у Reuters Lipper-у), тестирали су модел Elliott-ових таласа (Elliott Wave Theory) тако што су покушали да утврде да ли се на финансијском тржишту Фибоначијева рација појављују не-насумично што је основна претпоставка модела. Наведена студија није изнела довољно научних доказа који би потврдили да се цене враћају на Фибоначијев однос или најближи заокружени разломак претходног тренда (Batchelor, Ramyar, 2005, стр. 13, 31). С друге стране, Robert Prechter је сматрао да наведена студија „не доводи у питање ваљаност било ког аспекта принципа таласа... подржава запажања теоретичара таласа“, јер су Batchelor-Ramyar испитивали односе између цена постигнутих у филтрираним трендовима, а не Elliott-овим таласима, „њихов метод се не бави стварним тврдњама теоретичара таласа“ (Prechter, 2006, стр. 2). У прилог тврдњи Prechter-а, говоре и резултати Института социономике (The Socionomics Institute) који је независно прегледао податке студије Batchelor-Ramyar и утврдио да подаци показују да се Фибоначијеви односи појављују на берзи чешће него што би се то претпоставило условима случајног окружења (Goel, 2006).

Након Elliott-ове смрти 1948. године, поборници техничке анализе и финансијски стручњаци наставили су да примењују принципе таласа и дају прогнозе инвеститорима. Wall Street се упознао са принципима Elliott-ове теорије захваљујући Elliott-овој књизи „*Wave Principle*“ коју је објавио Charles Collins а који је истакао да је допринос Elliott-ове теорије техничкој анализи идентичан доприносу који је дао Charles Dow. Frost A. J. је заједно са Robert Prechter-ом 1978. објавио књигу „*Elliott Wave Principle*“. Robert Prechter је испитивао Elliott-ове радове док је радио као тржишни техничар у Merrill Lynch и постао је најпознатији Elliott-ов аналитичар. Његово добро прогностичко умеће током биковског тржишта 1980-их довело је до популаризације Elliott-овог рада (Landon, 2007). Међу тржишним техничарима, анализа таласа је широко прихваћена као компонента њихове стратегије трговања. Robin Wilkin, бивши глобални шеф техничке стратегије за валуте и робу у JPMorgan Chase-у сматрао је да Elliott-ова теорија пружа оквир вероватноће када треба да се уђе на одређено тржиште а када да се изађе (Wilkin, 2006). Jordan Kotick, глобални шеф техничке стратегије у Barclays Capital и бивши председник Удружења тржишних техничара (Market Technicians Association), тврдио је да је Elliott-ово откриће било много испред свог времена, те да су тек током последњих деценија многи истакнути академици прихватили Elliott-ову идеју и агресивно се залагали за постојање фрактала на финансијским тржиштима (Kotick, 2005). Физичар Didier Sornette, гостујући професор на UCLA, у свом коауторском раду објављеном 1996. године, истакао да је интригантно да документоване лог-периодичне структуре имају извесну сличност са Elliott-овим таласима техничке анализе, те да је много напора уложено у финансије како од стране академских и трговинских институција, а однедавно и физичара (који користе неке од својих статистичких алата развијених за решавање проблема сложених временских серија) за анализу података из прошлости како би се добиле информације о будућности, и да је Техника Elliott-овог таласа најпознатија у овој области. Уколико се снажно укорени у анализу финансијских аналитичара она сигурно постаје и основа критичке структуре берзе (Sornette, Johansen, Bouchaud, 1996, стр. 167–175).

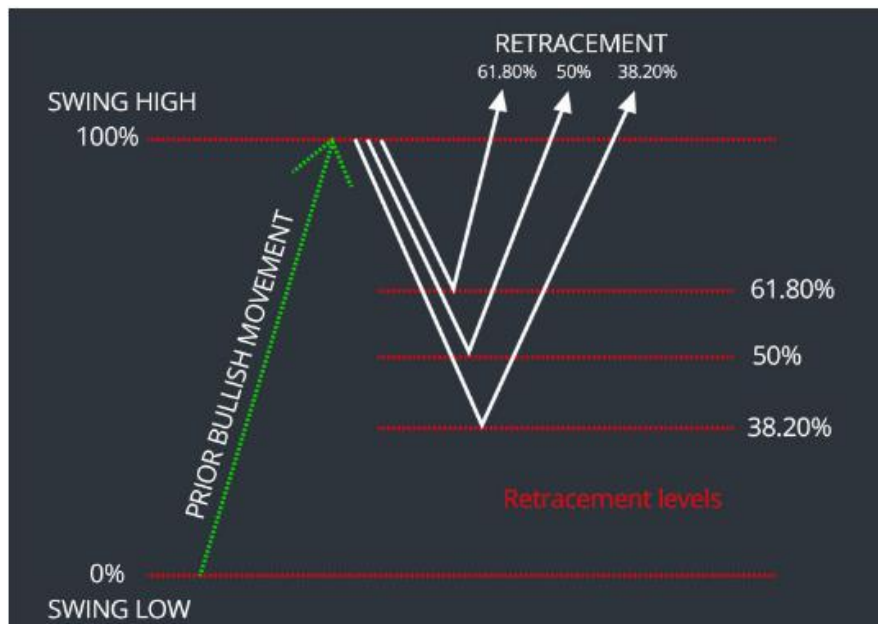
Критичари Elliott -ове теорије полазе од чињенице да је претпоставка да се тржишна кретања одвијају у препознатљивим обрасцима у супротности са хипотезом ефикасног тржишта (Efficient Market Hypothesis), која гласи да се цене не могу предвидети на основу тржишних података као што су покретни просеци и обим. Овим резонувањем, ако би успешне тржишне прогнозе биле могуће, инвеститори би куповали (или продавали) када метода предвиди повећање цене (или смањење), до те мере да би цене одмах порасле (или опале), чиме би се поништила профитабилност и предиктивна моћ модела. На ефикасним тржиштима, примена Elliott-ове теорије таласа међу трејдерима довела би до ишчезавања образаца које су трејдери покушали да предвиде, чиме би сама метода али и сви облици техничке анализе постали у практичном смислу бескорисни. Benoit Mandelbrot је поставио питање да ли Elliott-ови таласи могу да предвиде кретање финансијског тржишта, сматрајући да је предвиђање применом Теорије таласа веома неизвесно, јер је то уметност у којој је субјективни суд чартиста важнији од објективне, поновљиве пресуде бројева (Mandelbrot, Hudson, 2004, стр. 245). Robert Prechter је истакао да су идеје које је изнео Mandelbrot потекле од Elliott-а, који их је свеобухватније и тачније изложио у односу на тржишта у стварном свету у својој књизи „*The Wave Principle*“ 1938. године (<http://www.elliottwave.com/response/default.htm>). Критичари такође упозоравају да је таласни принцип превише нејасан да би био примењив, јер не може доследно да идентификује када талас почиње или се завршава, и да су прогнозе Elliott-овог таласа склоне субјективној процени. Чак и

² Jaroslav Sawa, Technical Analysis, Creative Commons Attribution-Share Alike 3.0 Unported <http://creativecommons.org/licenses/by-sa/3.0/>

заговорници техничке анализе тржишта довели су у питање вредност Elliott-ове анализе таласа, на пример, технички аналитичар David Aronson који сматра да Elliott-ова теорија таласа није легитимна теорија, јер поседује способност да се уклопи у било који сегмент историје тржишта све до његових најситнијих флукуација, што је омогућено лабаво дефинисаним правилима методе и способношћу постулирања великог броја угнежђених таласа различите величине (Aronson, 2006, стр. 61).

3. Трговање применом Фибоначијевог повлачења (Retracement-a)

Када се уцртају Фибоначијеве линије повлачења на графикону, могуће је предвидети потенцијалне тачке преокрета у којима ће се наићи на подршку или отпор. Ако су повлачења заснована на биковском кретању (Bull trend), повлачења би требало да укажу на потенцијалне нивое подршке где ће се силазни тренд преокренути на биковски. Ако су повлачења заснована на медведском кретању (Bear trend), повлачења би требало да укажу на потенцијалне нивое отпора где ће се одскок преокренути у опадајућем смеру. Најчешћи преокрети засновани на Фибоначијевим повлачењима се дешавају на нивоима од 38,20%, 50% и 61,80% (50% не долази из Фибоначијевог низа, већ из теорије да се акције у просеку враћају у половину својих претходних кретања). Иако се повлачења дешавају на линији од 23,60%, они су ређи и захтевају велику пажњу јер се дешавају релативно брзо након почетка преокрета. Уопштено речено, линије повлачења могу се сматрати снажнијим нивоима подршке и отпора и ситуацијама када дође до преклапања са кључним покретним просеком (нпр. 50-или 200-дневни покретни просек).



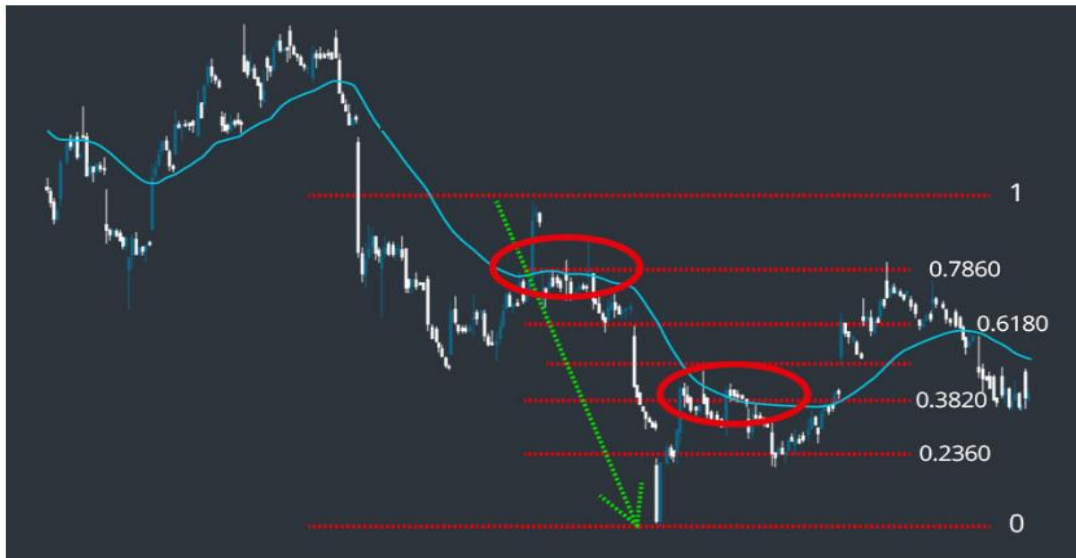
Слика 6. Најчешћи преокрети засновани на Фибоначијевим повлачењима

Извор: <https://scanz.com/fibonacci-retracements-guide/>

Кад год се примењује Фибоначијево повлачење, треба имати у виду да линије повлачења представљају потенцијалне нивое подршке и отпора јер оне представљају нивое цена на којима треба бити опрезан, а не чврсте сигнале за куповину и продају. Важно је користити додатне индикаторе, превасходно MACD (*Moving Average Convergence Divergence*), да би се идентификовало када се заправо налази на подршку или отпор и када је вероватан преокрет. Што више индикатора упућују на преокрет, већа је вероватноћа да ће до њега доћи. Неуспели преокрети се најчешће догађају на нивоима повлачења од 38,20% и 50%.

Фибоначијева повлачења су донекле слична покретним просецима јер се оба индикатора могу користити за идентификацију нивоа подршке и отпора. Међутим, теорије на којима се заснивају ова два индикатора су потпуно различите. Фибоначијева повлачења су заснована на математички дефинисаном Фибоначијевом низу и његовој свеprisутности у природи, уметности и науци, док покретни просеци једноставно прате кретање цена акција. Као резултат тога, Фибоначијева повлачења су фиксни нивои цена након почетног кретања цене, док се покретни просеци

мењају током времена како цена наставља да флукутира након почетног кретања цене и следећег преокрета. Када се нивои Фибоначијевог повлачења и покретни просеци поклапају, ниво подршке или отпора је обично јачи (што је приказано заокруженим пољима на слици 6).



Слика 7. Фибоначијева повлачења и покретни просеци
Извор: <https://scanz.com/fibonacci-retracements-guide/>

3.1. Практична примена Фибоначијевог повлачења у ситуацији растућег тренда

У наредном практичном примеру (<https://scanz.com/fibonacci-retracements-guide/>) графички интерпретираном на слици 8. приказано је како се Фибоначијева повлачења могу користити за идентификацију више нивоа подршке који могу помоћи у предвиђању узорка укупног биковског кретања (Bull trend). У овом случају, цена акција Apple-a (AAPL) доживљава почетни скок на нивоу повлачења од 23,8% – скок који се десио тако брзо да га MACD (*Moving Average Convergence Divergence*) није могао предвидети, а без ове потврде би била ризична трговина за већину трговаца. Међутим, нивои повратка од 50% и 61,80% касније пружају додатну подршку након већих повлачења, а преокрети на оба ова нивоа подршке могу бити потврђени укрштањем линије биковског сигнала у MACD-у.



Слика 8. Биковско кретање - прелазак сигналних линија и Фибоначијев индикатор
Извор: <https://scanz.com/fibonacci-retracements-guide/>

3.2. Практична примена Фибоначијевог повлачења у ситуацији опадајућег тренда

Наредни практични пример (<https://scanz.com/fibonacci-retracements-guide/>) графички интерпретиран на слици 9. приказано је како се Фибоначијева повлачења могу користити за идентификацију излазних тачака када се купује против општег медведског тренда (Bear trend). Графикон Petmed Ekpress-a (PETS) показује велико медведско кретање од јануара до маја, на крају којег је цена акција значајно одскочила. За трговце који су купили на дну – што је назначено укрштањем биковске MACD сигналне линије (*Moving Average Convergence Divergence*) и порастом RSI (*Relative Strength Index*) изнад 30 – пожељна је продаја на врху повратка. На отпор се наилази на нивоу повлачења од 23,8% и подржан је од стране RSI који је изнад 70, али овај преокрет није подржан MACD-ом и не успева. Уместо тога, преокрет на нивоу повлачења од 61,8% подржан је и RSI који је изнад 70 и укрштањем линије медведског сигнала у MACD-у – што заједно пружа јачу индикацију за трговце да напусте своје позиције на овом нивоу отпора.



Слика 9. Медведско кретање - прелазак сигналних линија и Фибоначијев индикатор
Извор: <https://scanz.com/fibonacci-retracements-guide/>

Поред наведеног, постоји још један начин коришћења Фибоначијевих односа: уместо да се пројектује циљана цена, трговци финансијским инструментима могу да пројектују време када ће доћи до циља, односно датум када ће се цене преокренути из узлазног тренда у опадајући тренд, и обрнуто (Kaufman, стр. 173).

Закључак

Трговци обично користе Фибоначијева повлачења као једноставан начин да идентификују нивое подршке и отпора приликом техничке анализе финансијске активе, попут акција, у одређеном тренду повлачења су статични и дефинисани према односима који се налазе у свеприсутном Фибоначијевом низу. Када се учртају Фибоначијеве линије повлачења на графикону, могуће је предвидети потенцијалне тачке преокрета у којима ће се наићи на подршку или отпор. Ако су нивои повлачења засновани на биковском кретању (Bull trend), повлачења би требало да укажу на потенцијалне нивое подршке где ће се силазни тренд преокренути на биковски. Ако су повлачења базирана на медведском кретању (Bear trend), повлачења би требало да укажу на потенцијалне нивое отпора где ће се одскок преокренути у опадајућем смеру. Најчешћи преокрети засновани на Фибоначијевим повлачењима се дешавају на нивоима од 38,20%, 50% и 61,80% (50% не долази из Фибоначијевог низа, већ из теорије да се акције у просеку враћају у половину својих претходних кретања). Иако се повлачења дешавају на линији од 23,60%, они су ређи и захтевају велику пажњу јер се дешавају релативно брзо након почетка преокрета. Генерално, линије повлачења се могу сматрати јачим нивоима подршке и отпора када се поклапају са кључним покретним просеком као што је 50- или 200-дневни једноставни покретни просек. Кад год се користи Фибоначијево повлачење, добијене нивое неопходно је тумачити веома опрезно и увек у комбинацији са додатним индикаторима као што је MACD (*Moving Average Convergence Divergence*) да би се потврдио преокрет тренда.

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Digitalisation and the company's competitive advantage

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Abstract

In today's globalised world, competitive advantage is one of the important characteristics of a company that enables it to exceed its competitors. A well-defined competitive advantage will enable a company to perform above average in the relevant field of companies in the long term. A firm that cannot clearly define its market differentiation and its competitive advantages has no perspective for long-term profitable existence in the market. Nowadays, innovation and the digitalisation of corporate activities are among the most important sources of competitive advantage. When innovations are implemented correctly, an enterprise can produce better quality products, improve the efficiency of the production process, better find potential customers and reduce costs. For a company's competitive advantage to be successful, it must create value for stakeholders and be difficult for others to reproduce. The main objective of the paper is to identify the competitive advantages that help the analysed company to achieve an exceptional market position and above-average economic performance.

At the beginning of the paper we also used the selection method, which was used mainly in the collection of important theoretical knowledge, which we obtained by studying domestic as well as foreign sources, necessary for understanding the issue. We used the descriptive method to identify the competitive advantages of the analysed company as well as its competitors. In the paper we used the method of analysis to compare individual companies operating on the Slovak automotive market. Later we used the synthesis method to compare the obtained results and clearly presented them in tables. Mathematical and statistical methods were used to calculate the individual and compare the advantages and disadvantages of each type of car, their performance, price as well as the positive solution to the environmental pollution in the Volkswagen company. In the thesis we also used the method of comparison, which was used in comparing the competitive advantages. The methods of induction and deduction were used especially in the formulation of the conclusions, which clearly showed the importance of the competitive advantages of Volkswagen Slovakia, a. s...

Keywords: Competitive advantage, Financial analysis, Innovation, Digitalization, Volkswagen Slovakia, a. s.

1. Introduction

Today's globalised and digital world is and will be extremely to implement innovation and digitalisation for reach competitive advantage. Competition is a part of developed companies, where they have to fight to remain profitable and to grow their profits. The companies need to be at the forefront of their business. Competition is hard and the companies have to be at the very least one step ahead of their competitors in their industry. As market conditions change due development advanced technologies, industries today are changing very quickly. Today's environment is characterised by intense and rapid competitive movements, from stable oligopolies to an environment characterised by intense and rapid competitive movements, which are mainly driven by innovation and the digitisation process. Digitalisation and innovation belong to the most important tools for increasing market share and maximising profit for enterprises today. New information and communication technologies are significantly increasing the volume of new information about companies, consumer expectations and competition.

Consumer competition can be regarded as consumers wanting to buy as much as possible and as cheaply as possible. Such consumer behaviour is most common when demand is higher than supply. Competition between supply and demand shows the opposing interests of producers and consumers. Because, on the other hand, the producer's objective is to produce products at the highest possible price and, on the contrary, the buyer's objective is to buy as cheaply as possible.

Achieving a competitive advantage is one of the important tools for a company to successfully respond to current market challenges and achieve a dominant position in the market. The main aim of the paper is to identify the competitive advantages of Volkswagen Slovakia, a. s. on the base of theoretical approaches and we want to show how they influence their positive economic results.

For the successful achieving of the main goal we have defined partial goals, among which we include:

- on the basis of scientific foreign and domestic literature to define the theoretical definition of concepts such as competition, competitiveness, competitive advantage, innovation as a source of competitive advantage and digitalization as a source of competitive advantage,

- characteristics of Volkswagen Slovakia, a. s.,
- analysis of the Slovak automotive industry,
- characterisation of competitors,
- identification of competitive advantages of Volkswagen Slovakia, a. s., results (hereinafter Volkswagen).

To fulfil the aim of the paper, by analysing Volkswagen Slovakia, a. s. and the Slovak automotive industry, we have shown how individual competitive advantages have a significant impact on the company's position on the market and the achievement of above the market average economic results.

The basis for the development of the paper were publications of domestic, but especially foreign authors, which we present in the list of used literature. After studying various publications, we focused on innovation and digitalization as important sources of competitive advantage. In the practical part of our paper we analysed Volkswagen Slovakia, a. s. and its competitors in the industry. After a thorough analysis, we determined the main competitive advantages of Volkswagen.

2. Digitalisation as a competitive advantage

Digitalisation and digital transformation are driving change in the corporate world as new internet-based technologies are introduced. Accepting and adapting to the digital age is a requirement in business today, companies need to begin the transition to digital transformation.

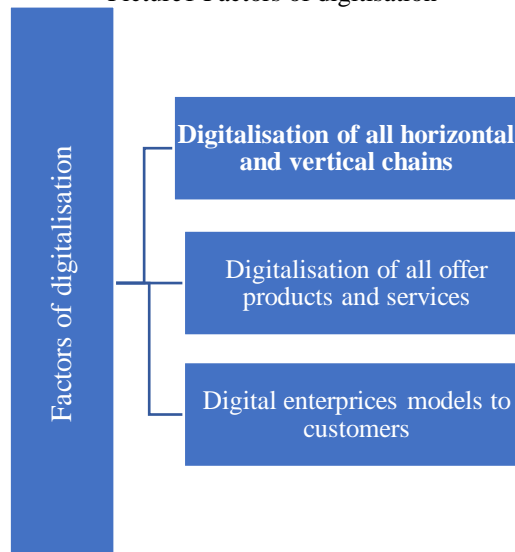
According to Christensen, digitalisation is the use of digital technologies with a view to increasing profitability and transforming business operations. With this approach, it is possible to implement a digital business that operates on the basis of digital data.

Kohl. states that digital transformation is possible only in an enterprise that has succeeded in digitalizing all components. Digital transformation changes the face of business and creates new business opportunities. The main areas that will be affected by the change are customers, data, innovation, added value and competitiveness. (Koh, L. – Orzes, G. – Jia, F. 2019).

Digitalisation is often referred to as a technology-driven transformation process that improves a company's flexibility and responsiveness by simultaneous bringing its operations, strategies, business processes, and organisational and IT structures into alignment. (Olsen, L. T. – Tomlin, B.:(2019)

The feature is smart grids based on cyber-physical systems, helping enterprises to adapt and optimise their processes according to various criteria such as cost, availability and resource consumption. The digital transformation of industry, or simply digitalisation, is more than just the acquisition of new IT equipment and systems; what is important is that people, machines, equipment, logistics systems and products are able to communicate and collaborate directly with each other in real time. Such a system increases the efficiency of production machinery and equipment, reduces costs and saves resources. A fundamental prerequisite for success is the digital skills of employees, which take time to gain. (Imgrund, F. A Kol. (2019)

Picture1 Factors of digitisation



Source: Own processing according to. Industry 4.0: Building od digital enterprise. Available at: 2016.<https://www.pwc.com/sk/sk/publikacie/assets/2016/ceo-prieskum/industry-4-0-budovanie-digitalneho-podniku.pdf>

Digitalisation of vertical and horizontal value chains: digitises processes across the enterprise in the vertical dimension, from product development to production and sales. Horizontal digitisation goes beyond internal operations, from suppliers to customers and to all key partners along the value chain. Digitalisation of product and service offerings - includes the expansion of

existing products, e.g. by adding smart sensors or communication devices, as well as the creation of new digitalised products and complex integrated solutions. This enables companies to gather information on product use and improve the product to meet growing consumer demands.

Digital business models and customer access: These innovative approaches are primarily used to generate additional digital revenue and to optimize the customer relationship. Digital products and services thus provide complete solutions in the company's own digital ecosystem. The components of digitalisation can include: (Koh, L. – Orzes, G. – Jia, F. (2019)

- Big Data analysis - helps to optimize production quality, save energy, improve additional services, facilitates real-time decision-making. Manufacturing companies have realized data analytics capabilities are essential for competitive advantage in the era of digitalization. It is widely applied in manufacturing to monitor the production process. Large volumes of data are also being used for fault detection, supporting new capabilities such as predictive analytics. (IBM. What is Industry 4.0? 2022)
- Autonomous robots - allow to increase productivity of production plants, they are most intensively used in mass production. They were first introduced by large enterprises, mainly in the automotive industry, which can afford large investments. Modern robotic systems are more flexible, autonomous and can cooperate with each other, which significantly reduces operating costs.
- Data storage and cloud systems - operate on a service basis, the user pays under pre-agreed conditions. The advantage is the expected cost savings, these services will allow even small and medium-sized enterprises to use large-scale storage and superior computing capacity. Cloud computing is a computing technology that is supported by virtualization technology, which provides enterprises with resource pooling, resource sharing, dynamic allocation.
- Augmented Reality (hereinafter AR) - refers to the placement of digital elements into a real-world image. The development of augmented reality requires spatial data - digital maps that allow information to be linked to a specific location. AR is mainly used in advertising, the automotive industry, warehousing and logistics operations, automated navigation, and many other areas.
- Internet of Things- (hereinafter IoT) connects the physical and virtual worlds to create smart environments. It is a global information society infrastructure, enabling advanced services based on the interconnection of things and information technology. It enables a combination of intelligent machines, advanced predictive analytics and machine-human collaboration to promote productivity, efficiency and reliability. The IoT can benefit product integration and coordination, information flow and enable decentralised decision-making, which can improve a company's ability to respond to environmental changes. (SAP. What is Industry 4.0? (2022)
- Blockchain - used to store large amounts of data in an accessible but, most importantly, secure way. Blockchain is a distributed and secure accounting ledger. It is distributed in the sense that it can be accessed and written to from any (possibly authorised) location and its data is stored in a peer-to-peer network (not in a central location). It is secure because once a block is added to the chain, it cannot be one-sidedly changed. (Olsen, L. T. – Tomlin, B.:(2019)
- Cybernetics and Artificial Intelligence - The goal of cybernetics and artificial intelligence is to provide interaction and data exchange, leading to autonomous coordination of units. As the volume of data increases, the ability of AI to learn autonomously and adapt to new circumstances will become increasingly important.
- 3D printing - creates final products using successive layers of materials, avoiding the assembly of components in the manufacturing process. Additive manufacturing techniques offer organisations design advantages as it allows small series to be produced in a customized manner the use of 3D technology can optimise smart manufacturing, significantly reducing a company's costs. It can offer products that were unimaginable a few years ago.

Every new concept or invention, has its advantages and disadvantages and digitalization is no exception. Digitalization of business activities has many advantages, but if they are not properly implemented and connected the required result may not come.

Table 1 Possible advantages and disadvantages of digitisation

Advantages	Disadvantages
increase in competitiveness	risk associated with hacking attacks
increased efficiency and productivity	investment requirements
new communication channels with customers	integrity of the production process
elimination of errors	increased energy consumption
improved working conditions	social isolation

Source: own processing according: Zálezlková, E. Nástup Industry 4.0. 2017. Available at: https://www.sam-km.sk/sites/www.sam-km.sk/files/2020-04/Zalezakova_Nastup_industry_4.0.pdf

Digitalization provides to the company new communication channels, which increases the marketability of the products. Production is more efficient, errors in the production process are eliminated, which significantly increases competitiveness. The digital transformation not only opens up sales channels, but also new ways of communicating with customers, such as email, apps and especially social networks. Now, social networks are an important communication channel with customers as a way to increase

sales, loyalty and customer retention. Digitalisation in the enterprise brings new employment opportunities such as flexible working hours or remote working. Digitalization also eliminates errors in the production process, which help to reduce costs for the company and saves resources.

Among the major disadvantages is the danger of hacker attacks, due to the fact that all electronic devices are connected via the Internet all over the world. The digitisation of business activities requires huge investments in digital technologies. Possible power blackouts can disrupt the integrity of the production process, as production lines are fully automated and production would have to be shut down without electricity. Increased use of digital technologies means higher energy consumption.

3. Innovation as a source of competitive advantage

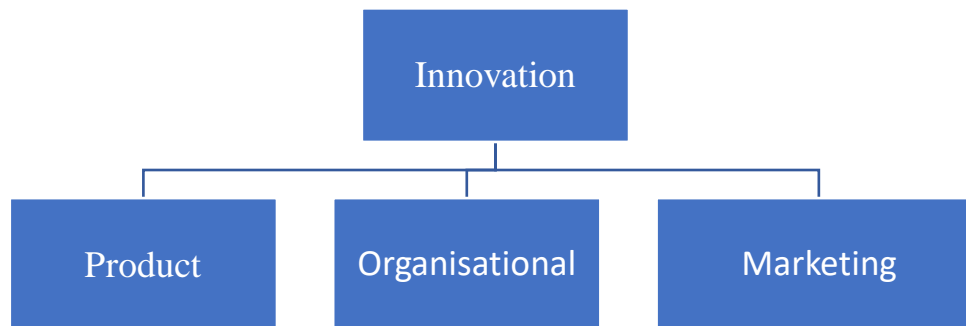
Innovation is a process that starts with an idea and, after different stages of development, leads to actual implementation. (Taylor, S. P.:(2017)

Among the first scientist, whom deal with innovation was J. A. Schumpeter, who considered "innovation as a certain change in the organization of an enterprise which leads to a new situation". (Lesáková, Ľ.:(2017)

According to Drucker, "innovation is a specific tool for entrepreneurs, it means to use change as an opportunity to introduce a new product or service. Entrepreneurs must deliberately seek out sources of innovation, changes and signals of change indicating opportunities for successful innovation". (Drucker, P.:(1985)

D.Burkus defines innovation as creativity and the ability to generate new and useful ideas, which, if not implemented, is considered as just an idea. (Burkus, D. (2022) Innovation is one of the fundamental manners in which a company delivers continuous value to the business or life of its customers and, in turn, to its shareholders and stakeholders, states Burkus. (Hobcraft, P. (2017)

Picture 2: Types of innovation



Source: Own processing according to Goffin, K. – Mitchell, R. Innovation management: Effective strategy and implementation. [online]. 3. Edit. New York: Palgrave Macmillan. 2017. ISBN 978-1-137-37343-4. Available at:

[https://books.google.sk/books?hl=sk&lr=&id=NSKHDAQBAJ&oi=fnd&pg=PP1&dq=GOFFIN+%E2%80%93+MITCHELL:+Innovation+management.+\(2005\)&ots=KotzN2oce9&sig=F4vZ2jaDjwzVGDWkRvqYsezKZ4U&redir_esc=y#v=onepage&q=GOFFIN%20%E2%80%93%20MITCHELL%3A%20Innovation%20management.%20\(2005\)&f=false](https://books.google.sk/books?hl=sk&lr=&id=NSKHDAQBAJ&oi=fnd&pg=PP1&dq=GOFFIN+%E2%80%93+MITCHELL:+Innovation+management.+(2005)&ots=KotzN2oce9&sig=F4vZ2jaDjwzVGDWkRvqYsezKZ4U&redir_esc=y#v=onepage&q=GOFFIN%20%E2%80%93%20MITCHELL%3A%20Innovation%20management.%20(2005)&f=false)

Product innovation means the introduction of goods or services that are new or significantly improved with respect to their characteristics or intended use, in particular technical specifications, materials, integrated software or other functional characteristics. (The Innovation Policy Platform (2021))

Process innovation is the application or introduction of a new technology or method that helps an organisation to remain competitive and meet customer requirements. Examples are the introduction of new automation equipment on a production line or the introduction of computer-aided design for product development. (Pratt, K: (2022)

Organisational innovation can be the introduction of new or significant changes in the structure of the firm, such as changes in management methods, improvements in the quality of products and services, or more efficient use of the firm's human potential as well as its relationship with external stakeholders. (Pratt, K: (2022)

Marketing innovation aims to better meet consumer needs and increase product sales. Companies seek to provide customers with services that are directly relevant to their needs and interests.³ Marketing innovations include changes in product project or design, changes in product positioning, changes in product promotion. (Richards, R. (2021)

Table2 Possible benefits and risks of innovation

Benefits	Risks
increasing labour productivity	innovation can be expensive and risky
reducing costs	customers may not accept them
new market opportunities	they can threaten jobs

improving the quality of products and services	competition
solving environmental problems	insufficient return on investment

Source: own processing according to INTEROBSERVERS. Benefits and Risks of Innovation: Balancing for Success. [online]. Available at: [Benefits and Risks of Innovation: Balancing for Success \(interobservers.com\)](https://www.interobservers.com)

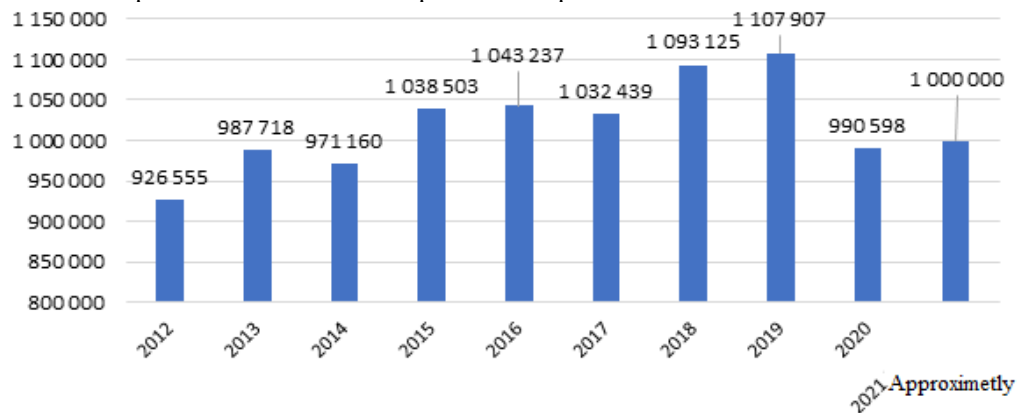
The biggest risk with innovation is that it is in most cases costly, which always involves a certain amount of risk. It is essential for a business to look at the benefits of an innovation before implementing it. Some innovations may not be accepted by customers, which means they will not buy or use them. If an employer decides to automate business activities, it may mean job loss for many employees. Innovation only brings a competitive advantage if competitors are unable to replicate it in their own businesses.

4. Analysis of the industry SK NACE 29100 Manufacture of motor vehicles

The automotive industry has a strong tradition in Slovakia and is the most important sector and driving force of the Slovak economy. The beginning of the automotive industry in Slovakia can be dated back to the period 1975-1989, when the first two factories for passenger cars and light commercial vehicles (BAZ and TAZ) were established. In the period 1989-1994, Slovakia experienced significant political and economic changes and the arrival of the first foreign investor, Volkswagen AG. The strengthening of the supply network attracted a second vehicle manufacturer, PSA Groupe, in 2003 and KIA in 2004. In 2015, Jaguar Land Rover, the last car manufacturer located in Slovakia, signed an investment plan. Currently, the automotive industry is the strongest sector in terms of its share in Slovakia's total GDP, Slovakia's exports, as well as job creation. The automotive industry is characterised by the close localisation of cooperating companies. In 2020, the share of the automotive industry in total GDP was 12% and it had a share of almost 43% in the country's total exports.

The share of automotive production in the total industrial production of Slovakia reached 47.7%. The automotive industry accounted for more than 42% of the country's total exports. The number of employees in the automotive industry registered a slight decline, with direct employment amounting to 164 thousand and aggregate employment to 245 thousand. (Zväz Automobilového Priemyslu Slovenskej Republiky. Výročná tlačová konferencia (2022))

Figure 1 Number of vehicles produced in the Slovak Republic in the period 2012-2021



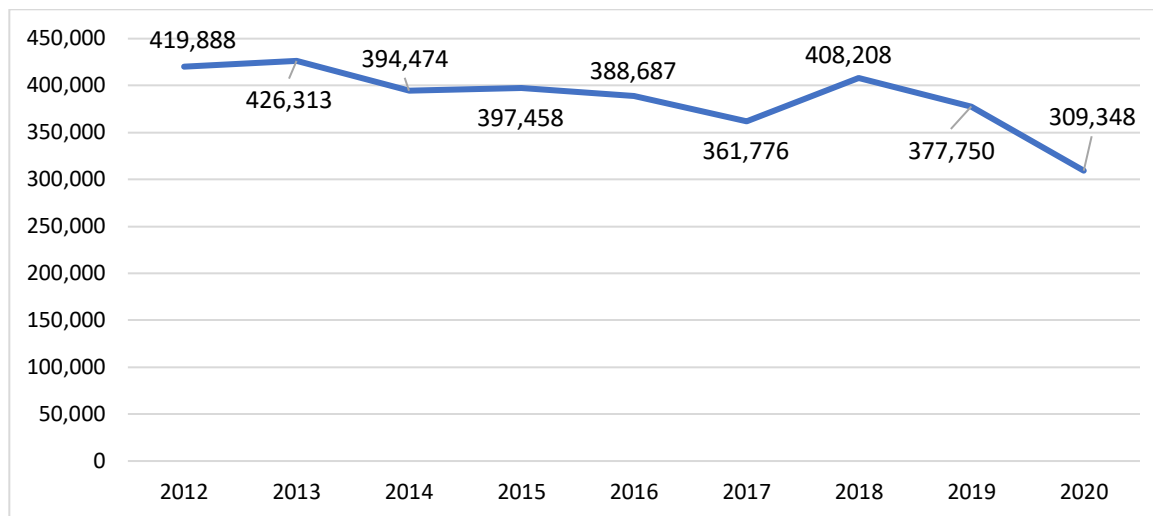
Source: own processing according to the Association of the Automotive Industry of the Slovak Republic. Annual press conference. Available at: <https://www.zapsr.sk/13-1-2022-sa-konala-vyrocnna-tlacova-konferencia/>

As Chart 1 shows, an all-time high of 1,107,907 cars were produced in 2019, when Jaguar Land Rover also participated in production. The decline in 2020 was due to the COVID - 19 pandemic, when production reduced by almost 11%. According to preliminary results, just over 1 000 000 cars were produced in 2021, a slight increase of around 4% compared to the previous year. Slovakia remains the world leader in vehicle production per capita. In 2021 there were 184 vehicles produced per 1,000 inhabitants. In total, almost 15 000 000 cars have already been produced in Slovakia.

The main objects of the company's economic activity are production and assembly of vehicles and their parts, production of transmissions, components, production of tools and equipment for automotive production and production of pressed parts. More than 99% of production is exported worldwide, with large SUVs being produced exclusively in Bratislava. The largest export markets by turnover are China, the USA and Germany. The company employs more than 11,500 people and is one of the largest employers in Slovakia. The company's number one position belongs to the amount of sales, which reached more than EUR 9.7 billion in 2020. Volkswagen Slovakia, a. s. has invested more than EUR 4.6 billion in Slovakia since 1991 and produced more than 6.5 million cars. An important instrument of assistance provided by Volkswagen Slovakia, a. s. is the Volkswagen Slovakia Foundation, which distributed more than EUR 1.7 million in 2020 and has distributed more than EUR 9 million in 12 years, especially for people with disabilities. The company has three plants in Slovakia, located in Bratislava, Stupava and Martin.

Average monthly earnings without management reached EUR 2,179 in 2020. The company's annual wage growth rate is 4.4%, and compared to the average wage in the national economy, employees have on average almost 50% higher salaries each year. At the same time, Volkswagen Slovakia, a. s. has committed to increase wages by 4.5% each subsequent year in 2019, which the company has maintained despite the coronavirus pandemic. The company not only pays the highest salaries in the Slovak automotive industry, but also offers its employees many social benefits. In 2019, the company spent €32.5 million on these benefits.

Figure 2 Number of cars produced in VW Slovakia, a. s. in the period 2012-2020



Source: own processing according to VOLKSWAGEN SLOVAKIA. Change and responsibility. In. Available at: https://sk.volkswagen.sk/content/dam/companies/sk_vw_slovakia/podnik/vyroczne_spravy/Vyroczna_sprava_2019.pdf

Volkswagen Slovakia, a. s. saw a 19% drop in production in 2020 compared to the previous year, caused by the COVID -19 pandemic, which severely limited production and caused problems with the supply of components at the end of the year.

In 2020, the company produced 43,275 EV vehicles, which represented a 14% share of total car production. The company produced a record 426,313 cars in 2013. Since the start of production, the company has produced more than 6.5 million cars.

4.1 Competitors

In addition to Volkswagen Slovakia, a. s., Kia Slovakia s. r. o., PCA Slovakia, s. r. o. and Jaguar Land Rover Slovakia s. r. o. operate on the Slovak automotive market.

Kia Slovakia s. r. o.

On 18 March 2004, the construction of Kia's first European automotive plant in Slovakia was officially approved by a contract signing ceremony in Bratislava between Kia Motors Corporation and the Government of the Slovak Republic. Kia Motors Corporation decided to build its first European plant based on the continuous increase in sales and growing market share in Europe. Kia Motors Slovakia s.r.o. is 100% owned by Kia Motors Corporation. Its core business is the manufacture of motor vehicles and engines. Kia is registered in the Commercial Register of the District Court of Žilina and is based in Teplice nad Váhom. It employs approximately 3700 employees and produces 2 car models, the KIA Ceed and Sportage, in its plant. In 2020, mainly due to the Covid-19 pandemic, it produced a lower number of vehicles compared to the original plan. In total, they produced 268,200 vehicles in 2020, a 22% decrease compared to the record production in 2019. This brings the cumulative number of vehicles to 3,870,400 since production began in December 2006. In 2020, EVs accounted for 8% of total production. Since 2004, the company has invested more than €2.1 billion in Slovakia. In 2020, KIA will achieve sales of EUR 4.5 billion and a profit after tax of almost EUR 106 million.

PCA Slovakia, s. r. o. laid the cornerstone of its plant in Slovakia on June 17, 2003 and exactly 3 years later the production of the first Peugeot 207 model started. Just three years after the cornerstone was laid, on 17 June 2003, production of the first Peugeot 207 was started in June 2006. At the end of 2008, production of the new Citroën C3 Picasso was begun, which was produced exclusively in Slovakia until June 2017. The company is based in Trnava and the maximum capacity of the plant is over 370,000 cars per year.

In 2021, the merger of **Fiat Chrysler Automobiles FCA and Groupe PSA**, of which the Trnava car plant is a part, will create a new company, Stellantis, which brings together 14 car brands. The Trnava car company is a leader in the production of small vehicles in the B-mainstream segment. It currently produces the extremely popular Citroën C3 and Peugeot 208 models.

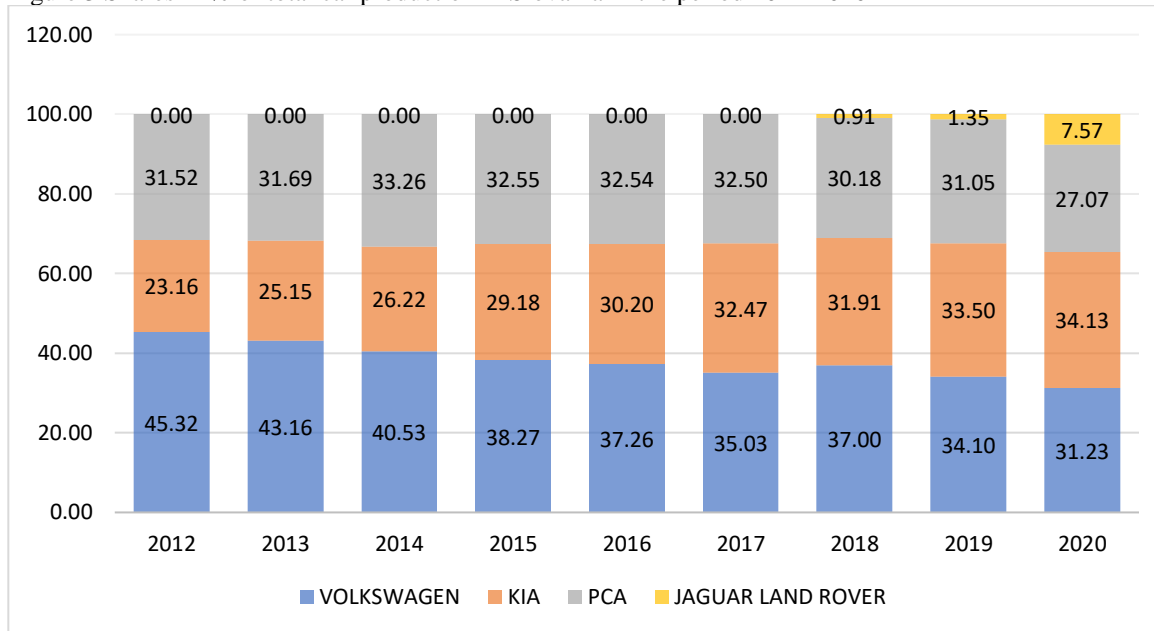
The company directly employed an average of 4,386 people by the end of 2020 and has already invested more than €1.2 billion in Slovakia. PCA Slovakia produced an impressive 338,050 vehicles in 2020, of which 33,334 were electric vehicles with the e-208 monogram. In total, the carmaker has already produced more than 3.5 million cars in Slovakia. In 2020, sales reached almost EUR 3.5 billion and profit after tax amounted to EUR 41.42 million.

Jaguar Land Rover Slovakia is the Slovak plant of the British car manufacturer Jaguar Land Rover, which is part of the Indian company Tata Motors from the Tata Group. Jaguar Land Rover signed an investment agreement with the government in December 2015, after which construction of the car plant in Nitra began.

Production was officially begun on 25 October 2018. The British company invested EUR 1.4 billion in the construction, with another EUR 129 million provided by Slovakia as state aid for the construction of the plant. The first model produced was the Land Rover Discovery.

In January 2020, the company also began production of the Defender. The company's maximum production is more than 150,000 cars per year and it has more than 3,800 employees. In total, more than 100,000 cars have been produced in the country. In 2020, the company achieved sales of almost 270 million euros and a profit of 11.5 million euros.

Figure 3 Shares in % of total car production in Slovakia in the period 2012-2020



Source: own processing according to the Association of the Automotive Industry of the Slovak Republic. Annual press conference Available at: <https://www.zapsr.sk/13-1-2022-sa-konala-vyrocn-tlacova-konferencia/>

4.2 Competitive advantages of Volkswagen Slovakia a. s.

By analysing the Slovak automotive industry and Volkswagen Slovakia, a. s., we will define its main competitive advantages, which help the company to achieve positive economic results and an exceptional position on the market.

Digitalisation and innovation

Volkswagen Slovakia, a. s. produces more than 300,000 cars in Slovakia every year, which forced the company to focus its activities on increasing the efficiency of processes, and the answer was digitalization in the form of a modern localization system and a digital twin, i.e. an identical twin of a real company in digital form. The aim of the digitisation project was to increase efficiency and save operating costs through implementing innovation. Asseco CEIT created an intelligent location system of the future for Volkswagen Slovakia, a. s., in which data on the movement of internal logistics assets are automatically collected. The collected data is used by the company to continuously optimize their movement, display their location in real time, forklift utilization, traffic density and the occurrence of narrow places, prevent accidents and injuries, simulate various crisis situations, and more.

An industrial transmitter and receiver solution based on UWB technology was deployed in the Bratislava plant, which ensured stable data collection on the movement of internal logistics. As a result, the company's forklift fleet was optimised by up to 20%. The new forklift navigation, which helps drivers use the optimal route and avoid bottlenecks, reduced the total distance travelled by the fleet by up to 10%. Subsequent optimisation has expanded the warehouse area by 20% without any construction, which represents a significant saving in operating costs.

Volkswagen Slovakia is a leader in state-of-the-art coupling technology. Since 2017, Volkswagen Slovakia, a. s. has been using the world's largest mass-produced metal 3D printer at the Stupava plant as the first manufacturer in the automotive industry. Already in 2017, more than 2,000 robots, augmented reality, online monitoring, self-driving trolleys or smart gloves with scanner were used in the production halls. The production of the entire factory is controlled from one place - the velino. In 2019, an electronic payroll was introduced, which saves costs and, not least, the environment. The company has introduced the eTorpass electronic application. A very simple and quick application for the user to process and approve a pass authorising the exit with a company vehicle to the plant. Volkswagen has introduced voice biometrics for the recovery of employee identification passwords in case of forgotten passwords. With this innovative service, the IT department has reduced the time taken to process new passwords. Every innovation and digitalisation help the company to increase labour productivity, resource efficiency and, last but not least, to reduce labour or operating costs.

Environmental policy

The Volkswagen Group is committed to the Paris Climate Agreement and is making a significant contribution to CO2 reduction. The goal of becoming a carbon-neutral company by 2050 is covered by the 2020 environmental strategy ZERO IMPACT FACTORY, which is the successor to the Think Blue strategy. Factors. In the context of climate change, the electrification of models, which the Volkswagen Group started in 2013, is essential. At that time, the production of the first Volkswagen e-up! Currently, all five SUV models are produced with plug-in hybrid drive. In the small urban vehicle segment, all three models are now fully electrified - Volkswagen e-up! SEAT Mii electric and ŠKODA CITIGOe iV

Table 3 Comparison of key indicators per car produced in VW Slovakia, a. s.

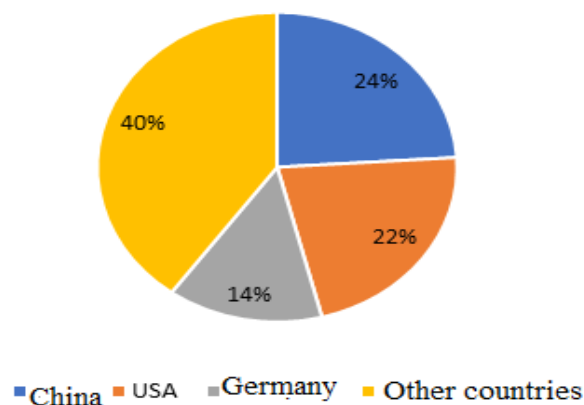
Indicator	Quantity	Baseline 2010	Year 2020	% reduction
Energy	kWh/vehicle	3080	1391	-55%
Water	m ³ /vehicle	5,97	2,43	-59%
CO2	t/vehicle	0,68	0,14	-79%
VOC - volatile organic compounds	kg/vehicle	3,71	2,23	-40%
Waste ending up in landfill	kg/vehicle	27,33	7,09	-74%

Source: own processing according to VOLKSWAGEN SLOVAKIA. Towards sustainability. In Annual Report 2020. 2021 Available at:

https://sk.volkswagen.sk/content/dam/companies/sk_vw_slovakia/podnik/vyroczne_spravy/Vyroczna_sprava_2020.pdf

. Volkswagen Slovakia, a. s. contributes to the reduction of CO2 by continuously introducing innovative technologies. A waste sorting system is in place at all workplaces, which increases the amount of waste that can be recycled. In addition, the production facilities also make a significant contribution to reducing the burden on the environment by continuously implementing organisational measures. In 2020, the company managed to save: 5,132,889 kWh of electricity, 3,416 m³ of water and reduce the volume of waste by more than 18 tonnes.

Figure 4 Export of VW Slovakia, a. s. vehicles by country in %



Source: own processing according to VOLKSWAGEN SLOVAKIA. Towards sustainability. In Annual Report 2020. 2021. Available at:

https://sk.volkswagen.sk/content/dam/companies/sk_vw_slovakia/podnik/vyroczne_spravy/Vyroczna_sprava_2020.pdf

More than 99% of the production of Volkswagen Slovakia, a. s. was exported abroad in 2020. The largest export markets in terms of turnover for the end customer were China, the USA and Germany. Volkswagen Slovakia, a. s. is one of the largest Slovak exporters of all companies based in Slovakia.

Table 4 Comparison of electric vehicles produced in Slovakia

Producer	Model	Power in kW	Distance	Charging time	Max. Speed	Price in € from
VW	VW e-up!	60	260	60 min.	130	22 170
VW	Seat Mii electric	61	320	48 min.	130	20 650
VW	Škoda Citigo iV	61	265	65 min.	130	17 590
PCA	Peugeot e208	100	360	55 min.	150	30 590

Source: own processing

Volkswagen Slovakia, a. s. produces the largest number of electric vehicles on the Slovak market. The company produces fully electrified models in the Bratislava plant: the Volkswagen e-up! Seat Mii electric and Škoda Citigo iV, which are classified as small city cars. The only competitor that produces electric cars is PCA Slovakia. PCA Slovakia produces in Slovakia the e208 model, classified as class B - mainstream. Table 6 provides a comparison of cars produced in Slovakia. The Peugeot e208 is better in selected attributes, but on average it is 50 % more expensive compared to Volkswagen models. The Bratislava plant became Europe's third largest producer of electric cars in 2020 with 43,275 units, while the Trnava plant ranked eighth with 34,300 units, thanks to the production of the Peugeot e-208.

Conclusion

Competitive advantage divides a surviving firm from a profitable enterprise. To create a competitive advantage, a company must provide a clearly defined value to its target market that is greater than its competitors offer. In today's globalised world, competitive advantage is becoming a precondition for gaining market leadership and realising positive economic results. In the age of modern technology, we consider innovation and the process of digitisation of business activities as the main sources of gaining competitive advantage.

The main objective of the paper was to identify the competitive advantages of Volkswagen Slovakia, a. s. and to show how they influence its positive economic results by implementation of innovation and digitalisation. The first sub-objective was to define theoretical concepts such as competition, competitive advantage, competitiveness and innovation and digitalization and sources of competitive advantages. The next sub-objective was the analysis of the Slovak automotive industry. That's why, we analysed Volkswagen and its competitors in the industry.

In the next sub-goal, we identified competitive advantages. We define innovation, digitalization, environmental policy and the company's product portfolio as the most important factors, which helped us to compare Volkswagen with its competitors and also with the industry average. This comparison helped us to demonstrate how strongly the company's competitive advantages contribute to its above-average financial and economic results. These significant competitive advantages of Volkswagen Slovakia, a. s. is manifested in the constantly increasing quality of the cars produced, employee satisfaction, but most importantly, the growing interest of potential customers in the company's products.

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